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West Indian mosses—I

ELIZABETH GERTRUDE BRITTON

(WITH PLATE 25)

A. WEST INDIAN MOSSES KNOWN TO LINNAEUS

In Linnaeus' Species Plantarum* 8 genera† and 103 species of mosses are recognized, of which only 2 are known to be tropical American in their distribution, ranging from southern Florida to South America. The first of these tropical species is *Bryum albidum* L. (p. 1118) known to Dillenius‡ as *Bryum nanum, lariginis foliis albis*, and now known as *Octoblepharum albidum* (L.) Hedw., with the type locality on the island of New Providence in the Bahamas.

The other species, *Rhizogonium spiniforme* (L.) Bruch was the first species of *Hypnum* named by Linnaeus and it also was based on a Dillenian description and plate.§ He called it "the *Herring's-Bone Hypnum*" and his specimens were sent to him from Mt. Diabolo, Jamaica, by Sir Hans Sloane. Its range through the tropics is even wider than that of *Octoblepharum*, including the Islands of the Pacific; both species are known to occur not only throughout the American tropics but also in Asia and Africa.

* 1106–1130. 1753.

† 1. *Sphagnum*..... 2
2. *Phascum*..... 3
3. *Fontinalis*..... 4
4. *Splachnum*..... 3
5. *Polytrichum*..... 3
6. *Mnium*..... 18
7. *Bryum*..... 30
8. *Hypnum*..... 40
103

‡ Historia Muscorum 364. *pl. 46. f. 21.* 1741.

§ Historia Muscorum 332. *pl. 43. f. 68.* 1741.

[The BULLETIN for November (40: 599–652. *portrait*) was issued 24 N 1913.]

1. OCTOBLEPHARUM ALBIDUM (L.) Hedw. Descr. 3: 15. 1791

Bryum albidum L. Sp. Pl. 1118. 1753.

TYPE LOCALITY: New Providence, Bahamas.

DISTRIBUTION: Florida and the Bahamas, throughout the West Indies; in Cuba, Jamaica, Haiti and St. Domingo, Porto Rico, Dominica, St. Thomas, St. Kitts, Montserrat, Guadeloupe, Martinique, St. Lucia, Grenada to Trinidad; also in South America and tropical regions of Africa and Asia.

ILLUSTRATIONS: Dill. Hist. Musc. *pl. 46. f. 21;* Hedw. Descr. 3: *pl. 6A;* Card. Rech. Anat. Leuc. *pl. 12. f. 61.*

EXSICCATAE: Sull. Musci Cub. Wright. *55.* 1861; Husnot, Pl. Ant. Fr. *121.* 1868; Austin, Musci App. Suppl. *478.* 1874; Ren. & Card. Musci Am. Sept. Exsicc. *213;* Holz. Musci Acroc. Bor. Am. *57;* Small, Mosses S. U. S. *52.*

2. RHIZOGONIUM SPINIFORME (L.) Bruch, Flora 29: 134. 1846

Hypnum spinaeforme L. Sp. Pl. 1122. 1753.

Mnium spiniforme C. Müll. Syn 1: 175. 1849.

TYPE LOCALITY: Mt. Diabolo, Jamaica, *Hans Sloane.*

DISTRIBUTION: In wet woods, in tropical regions of all portions of the world. Southern United States: Georgia, Alabama, Louisiana, Florida; Jamaica, Cuba, Haiti, Porto Rico, Guadeloupe to S. America; Mexico, Guatemala, Costa Rica, and Panama.

ILLUSTRATIONS: Sloane, Hist. Jam. *pl. 25. f. 4.* 1707; Dill. Hist. Musc. 332. *pl. 43. f. 8.* 1741.

EXSICCATAE: Sull. Musci Cub. Wright. *58.* 1861; Husnot, Pl. Ant. Fr. *152.* 1868; Austin, Musci App. Suppl. *516.* 1874; Ren. & Card. Musci Am. Sept. Exs. *64;* Holz. Musc. Acroc. Bor. Am. *174;* Pringle, Musci Mex. *10482.*

Another of the Linnaean species, *Hypnum cuspidatum* L., has been found in the high mountains of Jamaica. *Pogonatum urnigerum* L. Sp. Pl. 1109. 1753, was also credited to Jamaica, following Dillenius, who quotes Hans Sloane's History of Jamaica and mistook his *f. 5, pl. 25,* for this European species. *F. 4* of the same plate is unmistakable for *Rhizogonium spiniforme.*

B. WEST INDIAN MOSSES KNOWN TO OLOF SWARTZ

In his Prodromus, Swartz* retained 5 of the generic names

* Olof Swartz, Nova Genera & Species Plantarum seu Prodromus, etc. 138–142. 1788.

used by Linnaeus* and enumerated 41 species, which as at present recognized belong to 37 different genera, three of these having their type localities in Hispaniola (Haiti and Santo Domingo), all the rest in Jamaica.

In studying the collections made by Mr. Wm. Harris in Jamaica and our own later collections, a special effort has been made to obtain an accurate knowledge of these Swartz types and Dr. A. Le Roy Andrews, of Cornell University, very kindly consented, when he visited Stockholm in the summer of 1912, to examine these types for me and compare them with specimens from our own collections in Jamaica, sent as duplicates to the Naturhistoriska Riksmuseum. Dr. Andrews was able to see and compare the original specimens with ours in all but two cases: *Bryum parasiticum* Sw. [= *Syrrhopodon parasiticus* (Sw.) Besch.] and *Hypnum congestum* Sw. [= *Pleuropus congestus* (Sw.) Broth.], which species we have not yet been able to recognize, the former being from Hispaniola and the type lacking in Swartz' herbarium, the latter from Jamaica and Haiti. We suspect from the illustration given by Hedwig that the latter is probably referable to *Palamocladium Bonplandi* (Hook.) Broth., which Brotherus later refers to *Pleuropus*, though he states that he has not seen specimens of *Pleuropus congestus*.

In 1806 Swartz discarded his Linnaean limitations† and adopted some of the generic changes proposed by Hedwig (1792), to whom he sent specimens of most of his West Indian mosses, from which almost all of Hedwig's plates were drawn. This eliminated *Fontinalis* and *Mnium* from the West Indies and added seven genera‡ and three species to the list given in the Prodromus; he further amplified his list by giving more in detail the stations and habitats. These are translated and quoted in the following list of species in the sequence enumerated by Swartz, with their modern names, synonyms, and distribution as at present known to us from the West Indies:

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* *Fontinalis, Polytrichum, Mnium, Bryum,* and *Hypnum.*

† Fl. Ind. Occ. 3: 1759–1841. 1806.

‡ *Encalypta, Trichostomum, Tortula, Dicranum, Pterogonium, Neckera,* and *Leskea.*

1. **Neckera jamaicense** (Gmel.) E. G. Britton, comb. nov.

Fontinalis crispa Sw. Prod. 138. 1788. Not *Hypnum crispum* L. Sp. Pl. 1124. 1753.

Hypnum jamaicense Gmel. Syst. Nat. 2: 1341. 1791.

Neckera undulata Hedw. Descr. 3: 51. 1792.

Neckera undulata Hedw.; Sw. Fl. Ind. Occ. 3: 1780. 1806.

Neckeropsis undulata Kindb. Eu. & N. A. Bryin. 1: 20. 1897.

HABITAT AND TYPE LOCALITY: "On trunks of trees in dense low woods, Jamaica."

DISTRIBUTION: Not uncommon on trees from Florida and the Greater and Lesser Antilles to Trinidad; Mexico, Guatemala, and Panama; also in South America.

ILLUSTRATIONS: Dill. Hist. Musc. 294. *pl. 32. f. 8;* Hedw. Descr. *pl. 21* (from Swartz' type).

EXSICCATAE: Austin, Musci App. Suppl. *529;* Sull. Musci Cub. Wright. *75;* Husnot, Pl. Ant. Fr. *155;* Grout, N. A. Musci Pleur. *230.*

2. NECKERA DISTICHA (Sw.) Hedw. Descr. 3: 53. 1792

Fontinalis disticha Sw. Prod. 138. 1788.

Neckera disticha Hedw. Descr. 3: 53. 1792.

Neckera disticha Sw. Fl. Ind. Occ. 3: 1784. 1806.

Neckeropsis disticha Kindb. Eu. & N. A. Bryin. 1: 20. 1897.

HABITAT AND TYPE LOCALITY: On trunks of trees, Jamaica and Hispaniola.

DISTRIBUTION: Less common, on trees, Florida and the Greater and Lesser Antilles to South America; in Central America from Mexico to Panama; also in Africa.

ILLUSTRATION: Hedw. Descr. *pl. 22* (from Swartz' type).

EXSICCATAE: Austin, Musci App. Suppl. *530.*

3. PTEROBRYUM FILICINUM (Sw.) Mitt. Jour. Linn. Soc. 12: 425. 1869

Fontinalis filicina Sw. Prod. 138. 1788.

Neckera filicina Hedw. Descr. 3: 45. 1792.

Pilotrichum filicinum P. Beauv. Prod. 83. 1805.

Neckera filicina Sw. Fl. Ind. Occ. 3: 1788. 1806.

Pireella filicina Cardot, Rev. Bryol. 40: 18. 1913.

HABITAT AND TYPE LOCALITY: "Near Coldspring, high mountains of southern Jamaica, on trunks of trees."

DISTRIBUTION: Jamaica and Cuba.

ILLUSTRATION: Hedw. Descr. *pl. 18* (from Swartz' type).

EXSICCATAE: Sull. Musci Cub. Wright. *76*.

This species has immersed capsules and seems to belong where Mitten has placed it.

4. PILOTRICHUM HYPNOIDES (Sw.) P. Beauv. Prod. 83. 1805

Fontinalis hypnoides Sw. Prod. 138. 1788.
Neckera hypnoidea Hedw. Descr. 3: 43. 1792.
Neckera hypnoides Sw. Fl. Ind. Occ. 3: 1790. 1806.

HABITAT AND TYPE LOCALITY: "Jamaica, on trunks of trees in high mountains."

DISTRIBUTION: Jamaica to Trinidad.

ILLUSTRATION: Hedw. Descr. *pl. 17* (from Swartz' type).

5. CRYPHAEA FILIFORMIS (Sw.) Brid. Bryol. Univ. 2: 251. 1827

Fontinalis filiformis Sw. Prod. 138. 1788.
Neckera filiformis Hedw. Descr. 3: 41. 1792.
Neckera filiformis Sw. Fl. Ind. Occ. 3: 1786. 1806.

HABITAT AND TYPE LOCALITY: "Hispaniola, in arid regions on branches of *Haematoxylon campechianum*."

DISTRIBUTION: Jamaica, Cuba, and Santo Domingo; also in South America, Central America and Mexico (Guatemala and Yucatan).

ILLUSTRATION: Hedw. Descr. *pl. 16* (from Swartz' type).

EXSICCATAE: Sull. Musci Cub. Wright. *67*.

6. POGONATUM TORTILE (Sw.) Brid. Bryol. Univ. 2: 108. 1827

Polytrichum convolutum Sw. Prod. 139. 1788. Not L. 1753.
Polytrichum convolutum Hedw. Sp. Musc. 94. 1801.
Pogonatum convolutum Beauv. Prod. 85. 1805.
Polytrichum tortile Sw. Fl. Ind. Occ. 3: 1839. 1806.
Polytrichum domingense Brid. Mant. 201. 1819.
Polytrichum cubense Sull. Proc. Am. Acad. 5: 281. 1861.
Polytrichum glaucinum Besch. Ann. Sci. Nat. VI. 3: 210. 1876.
Polytrichum Husnotianum Besch. l. c.
Polytrichum crispulum Besch. l. c. 211.

Polytrichum laxifolium Besch. l. c. 211.
Polytrichum Pleeanum Besch. l. c. 212.
Polytrichum Sintenisii C. Müll. Hedwigia **37**: 222. 1898.
Polytrichum (Catharinella) obscuro-viridis C. Müll. Hedwigia **37**: 223. 1898.

HABITAT AND TYPE LOCALITY: "On clay banks, high mountains of southern Jamaica."

DISTRIBUTION: Cuba, Jamaica, Haiti, Porto Rico, Guadeloupe, Martinique, Dominica, Grenada, and Barbados.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 20.*

EXSICCATAE: Sull. Musci Cub. Wright. *57;* Husnot, Pl. Ant. Fr. *153.*

This species varies greatly according to habitat, whether dry or wet, sunny or shady. It usually grows on roadside banks of the hard red clay, on the dry or southern sides of the West Indian islands and under such conditions, does not attain the lax, long leaves that are produced in shady moist valleys. Microscopic sections of the leaves show the lamellae to be somewhat variable but all of one generally uniform character, and though the serrations of the margins are more or less variable, the teeth being at times appressed and at others spreading, we find no constant differences between them. The presence of teeth on the back of the costa is just as true of *P. tortile* Sw. as of *P. glaucinum* Besch.

7. BREUTELIA TOMENTOSA (Sw.) Sch. "In Hb." Paris, Index Bryol. **1**: ed. 2. 173. 1904

Mnium tomentosum Sw. Prod. 139. 1788.
Bryum tomentosum Sw. Fl. Ind. Occ. **3**: 1837. 1806.
Bartramia macrocarpa Hampe, Linnaea **32**: 141. 1863.
Bartramia macrotheca Hampe, Ann. Sci. Nat. V. **3**: 373. 1866.
Breutelia macrotheca Jaeg. Adumb. **1**: 556. 1873–74.

HABITAT AND TYPE LOCALITY: " On the edge of woods high mountains of Jamaica."

DISTRIBUTION: Jamaica and Guadeloupe to South America; also Mexico and Costa Rica.

ILLUSTRATIONS: Hooker, Musci Exot. *pl. 19.* 1818. From original specimen of Swartz. E. & P. Nat. Pfl. 1^3: 656. *f. 498.* 1904.

8. PHILONOTIS SPHAERICARPA (Sw.) Brid. Bryol. Univ. **2**: 25. 1827

Mnium sphaericarpon Sw. Prod. 139. 1788.
Mnium sphaericarpum Hedw. Descr. **3**: 93. 1792.
Bryum sphaericarpon Sw. Fl. Ind. Occ. **3**: 1835. 1806.
Bartramia sphaericarpa Mitt. Jour. Linn. Soc. **12**: 261. 1869.

HABITAT AND TYPE LOCALITY: "In shady mossy places, summits of mountains of southern Jamaica."

DISTRIBUTION: Florida, Jamaica, Porto Rico, St. Thomas, St. Kitts, St. Vincent, Martinique, and Guadeloupe; Honduras to South America.

ILLUSTRATION: Hedw. Descr. **3**: *pl. 38A*.

9. DITRICHUM RUFESCENS (Hampe) Broth. in E. & P. Nat. Pfl. 1^3: 300. 1901

Mnium strictum Sw. Prodr. 139. 1788. Not *Ditrichum strictum* Hampe. 1867.
Trichostomum strictum Sw. Fl. Ind. Occ. **3**: 1761. 1806.
Trichostomum pallidum strictum Schwaegr. Suppl. 2^1: 77. 1823.
Leptotrichum rufescens Hampe, Linnaea **31**: 521. 1862.
Cynontodium strictum Mitt. Jour. Linn. Soc. **12**: 42. 1869.
Cynontodium rufescens Mitt. Jour. Linn. Soc. **12**: 44. 1869.
Leptotrichum mexicanum Sch.; Besch. Mém. Soc. Sci. Nat. Cherbourg **16**: 174. 1872.
Leptotrichum capillifolium Sch.; Jaeg. Adumb. **1**: 388. 1871–72.
Leptotrichum pseudo-rufescens C. Müll. Bull. Herb. Boiss. **5**: 554. 1897.

HABITAT AND TYPE LOCALITY: "Jamaica, on shady slopes in sandy wet soil among other mosses, cold places."

DISTRIBUTION: Jamaica, 1,500–2,100 meters. Also, Mexico to Colombia.

ILLUSTRATION: Schwaegr. Suppl. *pl. 123*.

10. TORTULA AGRARIA (Sw.) Sw. Fl. Ind. Occ. **3**: 1763. 1806

Bryum agrarium Sw. Prod. 139. 1788.
Bryum acuminatum Sw. Prod. 139. 1788.
Barbula agraria Hedw. Descr. **3**: 17. 1792.
Barbula Raui Aust. Bull. Torrey Club **6**: 43. 1875.

HABITAT AND TYPE LOCALITY: "Jamaica and Hispaniola, in sugar fields and on calcareous rocks."

DISTRIBUTION: Florida and Texas. Common in the Bahamas on limestone rocks, whence it was known to Dillenius. Jamaica, Cuba, Porto Rico, Guadeloupe, Antigua, Montserrat to Trinidad and South America; also in Mexico.

ILLUSTRATION: Hedw. Descr. *pl. 6B*, from original specimens collected by Swartz in Jamaica and Santo Domingo.

11. BRYUM ACUMINATUM Sw. Prod. 139. 1788.
(See 10)

12. SYRRHOPODON LYCOPODIOIDES (Sw.) C. Müll. Syn. 1: 538. 1849

Bryum lycopodioides Sw. Prod. 139. 1788.
Dicranum? lycopodioides Sw. Fl. Ind. Occ. 3: 1766. 1806.

HABITAT AND TYPE LOCALITY: "Jamaica; in moist shady woods, on high mountains."

DISTRIBUTION: Jamaica, Santo Domingo, Haiti, Porto Rico, Guadeloupe, and Martinique to Trinidad.

EXSICCATAE: Husnot, Pl. Ant. Fr. *151*.

13. SYRRHOPODON PARASITICUS Besch. Ann. Sci. Nat. VIII. 1: 298. 1895

Bryum parasiticum Sw. Prod. 139. 1788.
Encalypta parasitica Sw. Fl. Ind. Occ. 3: 1759. 1806.
Calymperes parasitica Hook. & Grev. Edinb. Jour. Sci. 1: 131. 1824.

The type cannot be found at Stockholm in Swartz' herbarium. A fragment of the type specimen exists at Kew, and Mitten had only two leaves of it. He states that it is very close to *Calymperes Richardi* but the illustration given by Schwaegrichen of the calyptra and the description given by Swartz, "*Calyptra longa subulata, non laxa, pallida, ore aequali, latere demum fissili*" disprove this, and it is evident, either that Schwaegrichen was mistaken in figuring a calyptra which resembles that of a *Macromitrium* or it is a species of that genus, which is very common in Jamaica. Mitten referred a specimen collected by R. Spruce in South America (no. 2) to this species but that proves to be a true *Calymperes*.

The duplicate type from which Schwaegrichen's plate was drawn has been loaned to us from Geneva and corresponds with all of this plate except the calyptra, which is lacking; but the hyaline basal cells are not clearly indicated. It is evidently a species of *Syrrhopodon* with entire leaf margins bordered by elongated cells and does not agree with any known to us thus far from the West Indies.

HABITAT AND TYPE LOCALITY: Hispaniola. "On branches of *Haematoxylon* and *Mimosa Unguis-cati*."

DISTRIBUTION: Known only from the original collection.

ILLUSTRATION: Schwaegr. Suppl. 1: 60. *pl. 17.* 1811.

14. HOLOMITRIUM CALYCINUM (Sw.) Mitt. Jour. Linn. Soc. 12: 60. 1869

Bryum calcycinum Sw. Prod. 139. 1788.
Weisia calycina Hedw. Sp. Musc. 70. 1801.
Cecalyphum? calicinum Beauv. Prod. Aetheog. 50. 1805.
Dicranum calycinum Sw. Fl. Ind. Occ. 3: 1768. 1806.

HABITAT AND TYPE LOCALITY: "On roots of trees in high mountains. Jamaica."

DISTRIBUTION: Known only from Jamaica.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 14. f. 1–5.*

15. FISSIDENS PALMATUS (Sw.) Hedw. Descr. 3: 69. 1792

Hypnum palmatum Sw. Prod. 140. 1788.
Dicranum palmatum Sw. Fl. Ind. Occ. 3: 1774. 1806.
Skitophyllum palmatum De la Pyl. Jour. de Bot. II. 4: 146. 1814.

HABITAT AND TYPE LOCALITY: "In shady clayey places at roots of palms. Jamaica. Collected also on high trunk of *Areca oleracea*, in a cavity filled with rotten leaves."

DISTRIBUTION: Jamaica, Cuba, and St. Thomas.

ILLUSTRATIONS: Hedw. Descr. *pl. 30A.* 1792 (from Swartz' type); De la Pyl. Jour. de Bot. *pl. 35. f. 6.* 1814.

EXSICCATAE: Sull. Musci Cub. Wright. *11.*

16. FISSIDENS POLYPODIOIDES (Sw.) Hedw. Descr. 3: 63. 1792

Hypnum polypodioides Sw. Prod. 140. 1788.
Dicranum polypodioides Sw. Fl. Ind. Occ. 3: 1772. 1806.
Skitophyllum polypodioides De la Pyl. Jour. de Bot. II. 3: 153. 1814.

HABITAT AND TYPE LOCALITY: "On the ground in shady mossy slopes in high mountains, Jamaica."

DISTRIBUTION: Georgia, Alabama, Florida, and Louisiana; Jamaica, Cuba, Haiti, Porto Rico; Dominica, Guadeloupe, and Martinique, to South America; also, Mexico, Guatemala, and Panama.

ILLUSTRATIONS: Sull. Icon. Musc. *pl. 27;* De la Pyl. l. c. *pl. 38. f. 10.*

EXSICCATAE: Drummond, Musci Am. ed. 2. *38;* Sull. & Lesq. Musci Bor. Am. ed. 2. *87*: Sull. Musci Cub. Wright. *10;* Small, Mosses So. U. S. *9;* Husnot, Pl. Ant. Fr. *133*.

17. FISSIDENS ASPLENIOIDES (Sw.) Hedw. Descr. 3: 65. 1792

Hypnum asplenioides Sw. Prod. 140. 1788.

Dicranum asplenioides Sw. Fl. Ind. Occ. 3: 1770. 1806.

Skitophyllum asplenioides De la Pyl. Jour. de Bot. II. 4: 156. 1814.

Fissidens Barbae-montis C. Müll.; Ren. & Card. Bull. Soc. Roy. Bot. Belg. 31[1]: 152. 1892.

Fissidens costaricensis Besch. Bull. Herb. Boiss. 2: 390. 1894.

HABITAT AND TYPE LOCALITY: "On mossy rocks in high mountains of Jamaica."

DISTRIBUTION: Jamaica and St. Kitts; also Mexico and Costa Rica.

ILLUSTRATIONS: Hedw. Descr. *pl. 28* (from type); De la Pyl. Jour. de Bot. II. 4: *pl. 38. f. 8, 9.*

EXSICCATAE: Pringle, Musci Mex. *10,503*.

18. PHYLLOGONIUM FULGENS (Sw.) Brid. Bryol. Univ. 2: 671. 1827

Hypnum fulgens Sw. Prod. 140. 1788.

Pterigynandrum fulgens Hedw. Descr. 4: 101. 1797.

Pterogonium fulgens Sw. Fl. Ind. Occ. 3: 1776. 1806.

? *Phyllogonium viride* Brid. Bryol. Univ. 2: 673. 1827.

Phyllogonium aureum Mitt. Journ. Linn. Soc. 12: 424. 1869.

Phyllogonium globitheca C. Müll. Bull. Herb. Boiss. 5: 563. 1897.

HABITAT AND TYPE LOCALITY: "Dependent from branches of trees in high mountains of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Haiti, Porto Rico, St. Kitts, Antigua, Montserrat, Guadeloupe, Martinique, St. Vincent, and Grenada to Trinidad. Also in South America.

ILLUSTRATION: Hedw. Descr. *pl. 39* (from type).

EXSICCATAE: Sull. Musci Cub. Wright. *131;* Husnot, Pl. Ant. Fr. *154.*

There is some doubt as to what the type specimen of *Phyllogonium viride* of Bridel is. The type locality is Brazil and it is just possible that the name may antedate either *P. immersum* Mitt. or *P. Serra* C. Müll. Both these species were distributed by E. Ule in his Bryotheca Brasiliensis no. 81 from Serra Geral, Province of Santa Catharina, Brazil. All the West Indian specimens, so-called, are referable to *P. fulgens.*

19. LEPIDOPILUM DIAPHANUM (Sw.) Mitt. Jour. Linn. Soc. **12**: 382. 1869

Hypnum diaphanum Sw. Prod. 140. 1788.
Hypnum diaphanum Hedw. Sp. Musc. 243. 1801.
Hypnum? diaphanum Sw. Fl. Ind. Occ. **3**: 1828. 1806.
Pterygophyllum diaphanum Brid. Bryol. Univ. **2**: 345. 1827.
Hookeria diaphana W.-Arn. Disp. Musc. 56. 1825.

HABITAT AND TYPE LOCALITY: "In depressions, mountains of Jamaica. Mixed with *Marchantia* and *Jungermannia.*"

DISTRIBUTION: Jamaica, Martinique.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 61. f. 1–6* (from type).

20. CYCLODICTYON ALBICANS (Sw.) Broth. in E. & P. Pfl. 1^3: 935. 1907

Hypnum albicans Sw. Prod. 140. 1788.
Hypnum albens Gmel. Syst. Nat. **2**: 1343. 1791.
Leskea albicans Hedw. Sp. Musc. 218. 1801.
Leskea albicans Sw. Fl. Ind. Occ. **3**: 1811. 1806.
Hypnum pallidum Brid. Musc. Rec. 2^2: 127. 1806.
Pterygophyllum albicans Brid. Bryol. Univ. **2**: 349. 1827.

HABITAT AND TYPE LOCALITY: "On old and rotten trunks of trees, temperate regions of Jamaica."

DISTRIBUTION: Jamaica, Guadeloupe, St. Vincent, and Mexico.

ILLUSTRATIONS: Hedw. Sp. Musc. 218. *pl. 54. f. 13–16* (from type).

EXSICCATAE: Pringle, Musci Mex. *10,664.*

21. HOMALIA GLABELLA (Sw.) Mitt. Jour. Linn. Soc. **12**: 458. 1869

Hypnum glabellum Sw. Prod. 140. 1788.
Leskea glabella Hedw. Sp. Musc. 235. 1801.
Neckera glabella Sw. Fl. Ind. Occ. **3**: 1782. 1806.

HABITAT AND TYPE LOCALITY: "On trunks of trees in mountains of Jamaica."

DISTRIBUTION: Jamaica, Porto Rico, Guadeloupe, Mexico, Costa Rica, to Venezuela.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 59* (from type specimens).

22. METEORIOPSIS PATULA (Sw.) Broth. in E. & P. Pfl. I^3: 825. 1906

Hypnum patulum Sw. Prod. 140. 1788.
Hypnum patulum Hedw. Sp. Musc. 279. 1801.
Hypnum? patulum Sw. Fl. Ind. Occ. **3**: 1832. 1806.
Leskea remotifolia C. Müll. Linnaea **19**: 216. 1847.
Meteorium stellatum Lorentz, Moosst. 165. 1864.
Meteorium flaccidum Mitt. Jour. Linn. Soc. **12**: 443. 1869.
Meteorium tenue Sch. Besch. Mém. Soc. Sc. Nat. Cherbourg **16**: 227. 1872.
Meteorium diversifolium Besch. l. c.
Meteorium torticuspis C. Müll. Bull. Herb. Boiss. **5**: 204. 1897.

HABITAT AND TYPE LOCALITY: "On roots and branches of trees near the summits, mountains of Jamaica."

DISTRIBUTION: Florida, in hammocks near Cutler, *J. K. Small;* Jamaica, Haiti, Porto Rico, Guadeloupe, Martinique, Dominica, Montserrat, St. Vincent, Grenada, and Trinidad to South America; also Mexico, Guatemala, Honduras, Costa Rica, and Panama.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 73*.

EXSICCATAE: Sull. Musci Cub. Wright. *80;* Husnot, Pl. Ant. Fr. *168;* Pringle, Musci Mex. *15,136*.

This is a common and variable species in the tropics and accordingly has received a variety of names. There seems to be no reason for maintaining two sections and such a host of names in this genus, for according to Mitten and R. S. Williams the following also are synonyms of this species: *M. aureo-nitens* Hampe (not Hook.), *M. barbipendulum* C. Müll.; *M. cirrifolium* Schw.,

M. chiriquense Ltz., *M. Eurhynchium* C. Müll., *M. Filicis* C. Müll., and *M. subambiguum* (Hampe) Paris.

23. MITTENOTHAMNIUM REPTANS (Sw.) Card. Rev. Bryol. **40**: 21. 1913

Hypnum reptans Sw. Prod. 140. 1788.
Hypnum reptans Hedw. Sp. Musc. 265. 1801.
Hypnum reptans Sw. Fl. Ind. Occ. 3: 1819. 1806.
Microthamnium reptans Mitt. Jour. Linn. Soc. **12**: 506. 1869.
Hypnum pseudo-reptans C. Müll. Bot. Zeit. **14**: 439. 1856.
Microthamnium Turckheimii C. Müll. Bull. Herb. Boiss. **5**: 215. 1897.
Microthamnium minusculum C. Müll. Bull. Herb. Boiss. **5**: 565. 1897.
Stereohypnum reptans Fleisch. Hedwigia **47**: 275. 1908.

HABITAT AND TYPE LOCALITY: "On earth and trunks of trees, interior of Jamaica."

DISTRIBUTION: Cuba, Jamaica, Guadeloupe, Martinique, Mexico, Guatemala, Nicaragua, Costa Rica, Panama, and South America.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 68*.

24. POROTRICHUM FASCICULATUM (Sw.) Mitt. Jour. Linn. Soc. **12**: 468. 1869

Hypnum fasciculatum Sw. Prod. 140. 1788.
Hypnum fasciculatum Hedw. Sp. Musc. 245. 1801.
Hypnum? fasciculatum Sw. Fl. Ind. Occ. 3: 1827. 1806.
Thamnium fasciculatum C. Müll. Hedwigia **37**: 260. 1898.

HABITAT AND TYPE LOCALITY: "On roots of trees; high mountains of Jamaica."

DISTRIBUTION: Jamaica, Porto Rico, and Trinidad to South America.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 62. f. 8–10* (from Swartz' specimens).

25. HYPOPTERYGIUM TAMARISCI (Sw.) Brid. Bryol. Univ. **2**: 715. 1827

Hypnum Tamarisci Sw. Prod. 141. 1788.
Leskea Tamariscina Hedw. Sp. Musc. 212. 1801.

Hypnum Tamarisci Sw. Fl. Ind. Occ. **3**: 1825. 1806.
Hypopterygium brasiliense Sull. U. S. Expl. Exp. 26. 1859.
?*Hypopterygium pseudo-tamarisci* C. Müll. Linnaea **38**: 645. 1874.

HABITAT AND TYPE LOCALITY: "On trunks of trees, creeping among mosses in the cold regions of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Haiti, and Porto Rico; also in Mexico, Guatemala, Costa Rica, and South America.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 62. f. 8–10;* Sull. U. S. Expl. Exped. *pl. 26.*

EXSICCATAE: Sull. Musci Cub. Wright. *130;* Pringle, Musci Mex. *10,407.*

26. PILOTRICHELLA FLEXILIS (Sw.) Jaeg. Adumb. **2**: 162. 1875–76

Hypnum flexile Sw. Prod. 141. 1788.
Leskea flexilis Hedw. Sp. Musc. 234. 1801.
Hypnum? flexile Sw. Fl. Ind. Occ. **3**: 1830. 1806.
Meteorium flexile Mitt. Jour. Linn. Soc. **12**: 438. 1869.
Neckera cochlearifolia C. Müll. Syn. **2**: 130. 1851.
Neckera turgescens C. Müll. Syn. **2**: 131. 1851.
Pilotrichella eroso-mucronata C. Müll. Bull. Herb. Boiss. **5**: 563. 1897.
Pilotrichella recurvo-mucronata C. Müll. Bull. Herb. Boiss. **5**: 563. 1897.

HABITAT AND TYPE LOCALITY: "Summits of mountains in Southern Jamaica"

DISTRIBUTION: Jamaica, Cuba, Haiti, Porto Rico, Guadeloupe; Mexico, Guatemala, Nicaragua, Costa Rica, Panama; Colombia, Ecuador, Bolivia, and Brazil.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 58.*

EXSICCATAE: Pringle, Musci Mex. *10,420, 10,468,* Grout, N. A. Musci Pleur. *389.*

27. PAPILLARIA NIGRESCENS (Sw.) Jaeg. Adumb. **1**: 169. 1875–76

Hypnum nigrescens Sw. Prod. 141. 1788.
Hypnum nigrescens Hedw. Sp. Musc. 250. 1801.
Pterogonium nigrescens Sw. Fl. Ind. Occ. **3**: 1778. 1806.
Neckera nigrescens Schwaegr. Suppl. 3^2. 1828.

Meteorium nigrescens Mitt. Jour. Linn. Soc. 12: 441. 1869.
Papillaria nigrescens Donnellii Aust. Musci App. Suppl. 14. 1898.

HABITAT AND TYPE LOCALITY: "On branches of trees, high mountains of Jamaica. Collected on *Anacardium occidentale*."

DISTRIBUTION: Louisiana, Florida, and the Bahamas; Jamaica, Cuba, Haiti, Porto Rico, Barbados, and Trinidad to South America; also in Lower California, Mexico, Guatemala, Costa Rica, and Panama. Also in South America.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 65*. 1801; Schwaegr. Suppl. *pl. 241*. 1828; Bryologist 7: 14. 1904.

EXSICCATAE: Austin, Musci App. Suppl. *533*, Sull. Musci Cub. Wright. *83*.

The var. *Donnellii* is simply a xerophytic condition in which the leaves fall off and the terminal branches become brittle, thus propagating the species; in fact, the fruit is seldom found. Austin and J. D. Smith collected it at Caloosa, Florida, in 1876–78 and Mr. Severin Rapp has reported it from Sanford. In all our Jamaica collections I have found it but once, on a calabash tree.

28. PRIONODON DENSUS (Sw.) C. Müll. Bot. Zeit. 2: 130. 1844
Hypnum densum Sw. Prod. 141. 1788.
Hypnum densum Hedw. Sp. Musc. 282. 1801.
Hypnum? densum Sw. Fl. Ind. Occ. 3: 1829. 1806.
Neckera crassa Hornsch. Fl. Brasil. 1: 56. 1840.
Pilotrichum densum C. Müll. Syn. 2: 160. 1850.

HABITAT AND TYPE LOCALITY: "In Blue Mountains, southern Jamaica, on roots of trees."

DISTRIBUTION: Jamaica, Cuba, Haiti, Mexico, Costa Rica, and Panama, 1,500–2,000 ft.; also in South America.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 74* (from Swartz' type); Bot. Zeit. 2: *pl. 1*.

EXSICCATAE: Pringle, Musci Mex. *10.483*.

29. PILOTRICHUM COMPOSITUM (Sw.) P. Beauv. Prod. 82. 1805
Hypnum compositum Sw. Prod. 141. 1788.
Neckera composita Hedw. Sp. Musc. 203. 1801.
Neckera composita Sw. Fl. Ind. Occ. 3: 1792. 1806.

HABITAT AND TYPE LOCALITY: "On trunks of trees in woods, interior of Jamaica."

DISTRIBUTION: Jamaica and Grenada ("Costa Rica"?).

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 46. f. 8–13* (from Swartz' type).

30. LEPIDOPILUM POLYTRICHOIDES (Sw.) Brid. Bryol. Univ. **2**: 269. 1827

Hypnum polytrichoides Sw. Prod. 141. 1788.
Hypnum polytrichoides Hedw. Sp. Musc. 244. 1801.
Orthotrichum polytrichoides Brid. Musc. Recent. 2^2: 31. 1801.
Neckera polytrichoides Sw. Fl. Ind. Occ. **3**: 1794. 1806.
Lepidopilum polytrichoides var. *costaricense* Ren. & Card. Bull. Soc. Roy. Bot. Belg. 32^1: 192. 1893.
Hookeria Carionis C. Müll. Bull. Herb. Boiss. **5**: 205. 1897.

HABITAT AND TYPE LOCALITY: "On branches of trees and shrubs, also on rocks, mountains of Jamaica and Hispaniola."

DISTRIBUTION: Jamaica, Cuba, Haiti, Porto Rico, Guadeloupe, Martinique, Montserrat, and St. Vincent to South America: also, Mexico, Guatemala, Costa Rica, and Panama.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 61* (from Swartz' type); Schwaegr. Suppl. **3**: *pl. 231*.

EXSICCATAE: Husnot, Pl. Ant. Fr. *156*.

31. HELICODONTIUM CAPILLARE (Sw.) Jaeg. Adumb. **2**: 225. 1876–77

Hypnum capillare Sw. Prod. 141. 1788.
Leskea capillaris Hedw. Descr. **4**: 25. 1793.
Leskea capillaris Sw. Fl. Ind. Occ. **3**: 1813. 1806.

HABITAT AND TYPE LOCALITY: "On trunks of trees, interior of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Haiti, Porto Rico; also in Mexico and South America.

ILLUSTRATION: Hedw. Descr. **4**: *pl. 10*.

EXSICCATAE: Sull. Musci Cub. Wright. *70;* Pringle, Musci Mex. *759*.

32. RHACOPILUM TOMENTOSUM (Sw.) Brid. Bryol. Univ. **2**: 719. 1827

Hypnum tomentosum Sw. Prod. 141. 1788.
Hypnum tomentosum Hedw. Descr. **4**: 48. 1793.
Hypnum tomentosum Sw. Fl. Ind. Occ. **3**: 1823. 1806.
Rhacopilum tomentosum var. *gracile* Besch. Mém. Soc. Sci. Nat. Cherbourg. **16**: 257. 1872.

HABITAT AND TYPE LOCALITY: "On roots of trees near rivers, temperate regions of Hispaniola."

DISTRIBUTION: Louisiana, Bermuda, Cuba, Jamaica, Haiti, Santo Domingo, Guadeloupe, to Trinidad and South America; Mexico, Costa Rica, Guatemala, Nicaragua, and Panama; also in Asia and Africa.

ILLUSTRATIONS: Hedw. Descr. *pl. 19;* Bryologist **10**: *pl. 5*.

EXSICCATAE: Sull. Musci Cub. Wright. *74;* Pringle, Musci Mex. *10,501*.

33. CALLICOSTELLA DEPRESSA (Sw.) Jaeg. Adumb. **2**: 352. 1875–76

Hypnum depressum Sw. Prod. 141. 1788.
Leskea depressa Hedw. Sp. Musc. 215. 1801.
Leskea depressa Sw. Fl. Ind. Occ. **3**: 1804. 1806.

HABITAT AND TYPE LOCALITY: "On bark of trees, mountains of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Porto Rico, Haiti, and Guadeloupe.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 53. f. 1–7* (from Swartz' type).

34. **Clastobryum trichophyllum** (Sw.) E. G. Britton, comb. nov. PLATE 25

Hypnum trichophyllum Sw. Prod. 141. 1788.
Hypnum trichophyllum Hedw. Sp. Musc. 274. 1801.
Neckera trichophylla Sw. Fl. Ind. Occ. **3**: 1798. 1806.
Lepyrodon trichophyllus Mitt. Jour. Linn. Soc. **12**: 422. 1869.
Leucodon trichophyllus Jaeg. Adumb. **2**: 122. 1877.
Lepyrodon trichophyllus robustior Besch. Ann. Sci. Nat. VI. **3**: 224. 1876.

Palamocladium trichophyllum C. Müll. Flora **82**: 465. 1896.
Palamocladium trichophyllum subtile C. Müll. Hedwigia **37**: 240. 1898.
Orthothecium trichophyllum Fleisch. Fl. Buit. **3**: 667. 1906.

Plants light yellowish green, glossy; stems rooting and creeping, with simple erect branches, often 2 cm. high and prolonged into slender flagellate branchlets bearing brown septate gemmae in clusters in the axils of the upper leaves; branch-leaves crowded, spreading, glossy, strongly plicate when dry, lanceolate-acuminate, 3–5 mm. long, ecostate, margins plane, serrate; cells linear, walls porose, slightly thickened, alar cells shorter and broader, curved, forming a small, serrate auricle. Autoicous, perichaetial leaves shorter, paler, more suddenly subulate, more sharply serrate. Seta erect, straight or flexuose, red, 15–25 mm. long; calyptra cucullate; capsule erect, ovoid-cylindric, sometimes contracted below the mouth when dry, 2–3 mm. long, lid rostrate; annulus none; walls with irregular square or hexagonal cells 27–54 μ long $\times$ 27μ wide; neck short, stomatose; peristome double; teeth incurved, brown, narrow, not perforate, papillose, with slightly trabeculate lamellae; endostome paler, also papillose with a short basal membrane and rudimentary or imperfect cilia, segments shorter than the teeth, not split along the keel; spores green, minutely papillose, unequal in size, 5μ–16μ, maturing in winter.

Forming bright glossy mats in shade on trunks and roots of tree-ferns and palms on high mountains, rarely on rocks. Fruit rare!

HABITAT AND TYPE LOCALITY: "On bark and trunks of old trees, Jamaica."

DISTRIBUTION: Jamaica, Cuba, Porto Rico, Haiti, Santo Domingo, St. Kitts, Dominica, Martinique. Guadeloupe, St. Vincent, Montserrat, and Trinidad to Venezuela.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 71;* E. & P. Nat. Pfl. 1^3: 773. *f. 580 J–L.*

EXSICCATAE: Husnot, Pl. Ant. Fr. *183*, as *Meteorium sericeum* Sch.

On account of the rarity of its fruit this species has been placed in a variety of genera none of which seem to me to be correct. Its double peristome and different habit remove it from *Lepyrodon* and its tropical distribution from *Orthothecium*, the species of which are alpine or arctic and subarctic. Its relationship however seems to me to be more with the *Entodontaceae*, where Fleischer

has placed it; the presence of septate gemmae, and the ecostate leaves and more or less imperfect endostome, show its relationship to *Clastobryum indicum* Dozy & Molk. as figured by Brotherus (E. & P. Nat. Pfl. 1^3: 874. *f. 640.* 1907) but the leaf cells are porose and the walls are thickened as shown on the same page in *f. 639* of *C. planulum* Mitt.

Clastobryum americanum Cardot, originally described from Mexico, also occurs on the slopes and summit of Sir John Peak above Cinchona, in the Blue Mountains of Jamaica, and Mr. R. S. Williams has collected it in Bolivia at 8,000 ft. near Cargadera in 1902.

35. THUIDIUM MICROPHYLLUM (Sw.) Jaeg. Adumb. 2: 251. 1876–77

Hypnum microphyllum Sw. Prod. 142. 1788.
Hypnum microphyllum Hedw. Sp. Musc. 269. 1801.
Hypnum microphyllum Sw. Fl. Ind. Occ. 3: 1821. 1806.
Hypnum calyptratum Sull. Pac. R. R. Rep. 4: 190. 1856.

HABITAT AND TYPE LOCALITY: "On roots of trees, Jamaica."

DISTRIBUTION: Canada to Florida and the Bahamas, Jamaica, Cuba, and Mexico.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 69* (from Swartz' type); Sull. l. c. *pl. 100.*

EXSICCATAE: Sull. Musci Cub. Wright. *99.*

36. SEMATOPHYLLUM CAESPITOSUM (Sw.) Mitt. Jour. Linn. Soc. 12: 479. 1869

Hypnum caespitosum Sw. Prod. 142. 1788.
Leskea caespitosa Hedw. Sp. Musc. 233. 1801.
Leskea caespitosa Sw. Fl. Ind. Occ. 3: 1807. 1806.
Rhaphidostegium caespitosum Jaeg. Adumb. 2: 454. 1875–76.
*Hypnum loxense** Sull. Proc. Am. Acad. Arts & Sci. 5: 287. 1861. Not Hooker, 1822.

HABITAT AND TYPE LOCALITY: "On roots of trees, mountains of Hispaniola."

DISTRIBUTION: Cuba, Jamaica, Haiti, Porto Rico, Guadeloupe,

* The real *Sematophyllum loxense* (Hook.) Jaeg. has been found in Cuba.

and Martinique, to Trinidad and South America; also Mexico and Costa Rica.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 49.*

37. SEMATOPHYLLUM PUNGENS (Sw.) Mitt. Jour. Linn. Soc. **12**: 477. 1869

Hypnum pungens Sw. Prod. 142. 1788.
Hypnum pungens Hedw. Sp. Musc. 237. 1801.
Leskea pungens Sw. Fl. Ind. Occ. **3**: 1806. 1806.
Pungentella pungens C. Müll. Hedwigia **37**: 260. 1898.

HABITAT AND TYPE LOCALITY: "Roots of trees in moist woods, mountains of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Porto Rico, Virgin Islands, Guadeloupe, Martinique, and Dominica to South America; also Mexico and Guatemala to Panama.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 60* (from Swartz' type).

EXSICCATAE: Sull. Musci Cub. Wright. *104;* Husnot, Pl. Ant. Fr. *186.*

38. PLEUROPUS CONGESTUS (Sw.) Broth. E. & P. Nat. Pfl. **1**[3]: 1138. 1908

Hypnum congestum Sw. Prod. 142. 1788.
Hypnum congestum Hedw. Sp. Musc. 283. 1801.
Leskea congesta Sw. Fl. Ind. Occ. **3**: 1809. 1806.
Homalothecium congestum Jaeg. Adumb. **2**: 311. 1877–78.

HABITAT AND TYPE LOCALITY: "On old trunks of trees, interior of Jamaica."

DISTRIBUTION: Jamaica, Haiti, Montserrat, and Dutch Guiana.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 74. f. 4–7.* 1801.

Excepting for the illustration given by Hedwig, little is known of this species in modern times. Mitten and Brotherus had not seen specimens. At the British Museum there is a specimen labelled "*Leskea congesta* Sw. Ind. Occ. ex *Cl. Swartzio.* J. Vahl," which is evidently a mixture of *Palamocladium leskeoides* and *Clastobryum trichophyllum.* Hedwig's description calls for a plant with entire somewhat secund, falcate leaves and a horizontal capsule, characters which do not agree with either of the species named above.

The synonymy of *Palamocladium* is as follows:

Palamocladium leskeoides (Hook.) E. G. Britton, comb. nov.
Hookeria leskeoides Hook. Musc. Exot. *pl. 55*. 1818.
Leskea Bonplandi Hook.; Kunth. Syn. Pl. Aeq. **1**: 61. 1822.
Hypnum Bonplandi C. M. Syn. **2**: 463. 1851.
Homalothecium Bonplandi Jaeg. Adumb. **2**: 379. 1875-76.
Palamocladium Bonplandi Broth. Bot. Jahrb. **24**: 281. 1897.
Isothecium Bonplandi haitense Ren. & Card. MS. in herb.
Pleuropus leskeoides Hook. MS. in Herb.

39. ORTHOSTICHOPSIS TETRAGONA (Sw.) Broth. E. & P. Nat. Pfl. **1**[3]: 805. 1906

Hypnum tetragonum Sw. Prod. 142. 1788.
Hypnum? tetragonum Hedw. Sp. Musc. 246. 1801.
Hypnum? tetragonum Sw. Fl. Ind. Occ. **3**: 1833. 1806.
Pterigynandrum aureum Brid. Mant. 101. 1819.
Pterigynandrum quadrifarium Brid. Bryol. Univ. **2**: 194. 1827.
Isothecium tetragonum Brid. Bryol. Univ. **2**: 377. 1827.
Neckera quinquefaria C. Müll. Syn. **2**: 124. 1850.
Neckera tetragona C. Müll. Syn. **2**: 125. 1850.
Meteorium tetragonum Mitt. Jour. Linn. Soc. **12**: 431. 1869.
Pilotrichella tetragona Besch. Mém. Soc. Sci. Nat. Cherbourg **16**: 223. 1872.

HABITAT AND TYPE LOCALITY: "On trunks of trees, near summits of mountains in Jamaica."

DISTRIBUTION: Jamaica, Cuba, Santo Domingo, to Trinidad and Guiana; also in Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, and Panama.

ILLUSTRATION: Hedw. Sp. Musc. *pl. 63*. 1801 (from Swartz' type).

This moss is not uncommon in Jamaica and was known to Hans Sloane* and Dillenius,† who called it "the square-branched *Hypnum* from Jamaica." Both of these authors figured it rather poorly.

* Hist. Jam. **1**: 68. *pl. 25. f. 3*. 1707.
† Hist. Musc. 335. *pl. 43. f. 73*. 1741.

40. SCHLOTHEIMIA TORQUATA (Sw.) Brid. Bryol. Univ. 1: 323. 1826

Hypnum torquatum Sw. Prod. 142. 1788.
Hypnum torquatum Hedw. Sp. Musc. 246. 1801.
Neckera torta Sw. Fl. Ind. Occ. 3: 1800. 1806.
Schlotheimia torta Schwaegr. Suppl. 1^2: 39. 1816.
Schlotheimia pellucida C. Müll. Bull. Herb. Boiss. 5: 561. 1897.
Schlotheimia undato-rugosa C. Müll. Hedwigia 37: 238. 1898.

HABITAT AND TYPE LOCALITY: "On old mossy trunks of trees in woods, mountains of Jamaica."

DISTRIBUTION: Jamaica and Cuba, 5,000–6,000 ft. alt.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 63. f. 4-7* (from Swartz' type).

EXSICCATAE: Sull. Musci Cub. Wright. *52.*

41. MACROMITRIUM CIRRHOSUM (Sw.) Brid. Bryol. Univ. 1: 316. 1826

Hypnum cirrhosum Sw. Prod. 142. 1788.
Anoectangium cirrhosum Hedw. Sp. Musc. 42. 1801.
Neckera cirrhosa Sw. Fl. Ind. Occ. 3: 1802. 1806.
Schlotheimia cirrosa Schwaegr. Suppl. 3^1. 1827.

HABITAT AND TYPE LOCALITY: "On trunks of trees, temperate parts of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Haiti, Santo Domingo, Porto Rico, St. Kitts, Guadeloupe, Martinique, Montserrat, and Trinidad to South America; also, Guatemala and Panama.

ILLUSTRATIONS: Hedw. Sp. Musc. *pl. 5;* Schwaegr. Suppl. *pl. 201A.*

EXSICCATAE: Sull. Musci Cub. Wright. *51;* Husnot, Pl. Ant. Fr. *144.*

42. THUIDIUM INVOLVENS (Hedw.) Mitt. Jour. Linn. Soc. 12: 575. 1869

Leskea involvens Hedw. Descr. 4: 27. 1794.
Leskea involvens Swartz, Fl. Ind. Occ. 3: 1815. 1806.

HABITAT AND TYPE LOCALITY: "With *Helicodontium capillare* on trunks of trees, interior of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Haiti, Porto Rico, Guadeloupe, and Barbados to South America; also Mexico (Yucatan).

ILLUSTRATION: Hedw. Descr. *pl. 11* (from Swartz' type).

EXSICCATAE: Sull. Musci Cub. Wright. *98*.

43. **Turckheimia linearis** (Sw.) E. G. Britton, comb. nov.

Tortula linearis Sw. Fl. Ind. Occ. **3**: 1765. 1806.
Barbula linearis Brid. Mant. Musc. 88. 1819.
Trichostomum lineare Broth. E. & P. Nat. Pfl. 1^3: 394. 1902.

HABITAT AND TYPE LOCALITY: "On dry calcareous rocks, Hispaniola."

DISTRIBUTION: Jamaica, Cuba, and Haiti.

Our specimens from Jamaica and Cuba have a well-developed, slender peristome, which disappears from the old capsules. I believe this species to be congeneric with *Turckheimia guatemalensis* Broth., which also shows traces of a peristome though the capsules are all old. The section of the leaf in *T. linearis* is remarkable for having two rows of guide-cells of about 10 cells each in the costa, with a stereid band both above and below. The costa is rather broader than in *T. guatemalensis* and smooth on the dorsal side, showing as a prominent white rib to the leaf. It is papillose on the upper surface and the cells of the blade bear several minute papillae on both surfaces. This peculiarity of the costa removes *Turckheimia linearis* from *Trichostomum;* and although there is but a single row of guide-cells in *T. guatemalensis*, their macroscopic resemblance is so close that they appear to be congeneric.

44. ISOPTERYGIUM TENERUM (Sw.) Mitt. Jour. Linn. Soc. **12**: 499. 1869

Hypnum tenerum Sw. Fl. Ind. Occ. **3**: 1817. 1806.

HABITAT AND TYPE LOCALITY: "On trunks of trees, mountains of Jamaica."

DISTRIBUTION: Jamaica, Cuba, Haiti, Guadeloupe, Martinique, St. Lucia, to Trinidad and South America; also Bermuda, and Louisiana to Florida.

EXSICCATAE: Sull. Musci Cub. Wright. *107*.

According to Dr. Andrews' notes "the Swartz specimens, which are deposited in the collections of the Naturhistoriska Riksmuseum at Stockholm, are distributed through the herbarium of non-Scandinavian mosses, which are, in general, arranged after Paris's Index. Packets are generally uniform, one to many on the herbarium sheet. Swartz' specimens are recognizable by labels in his handwriting included in the packet, by the kind of paper with water-mark to which he pasted them and references of others to the origin of specimens."

We have seen specimens of all but two of these species, and have duplicates of many of them; it is therefore our intention to distribute sets of these and other West Indian mosses, in exchange for other exsiccatae and duplicates from the West Indies, Central America, and South America.

NEW YORK BOTANICAL GARDEN

Explanation of plate 25

Clastobryum trichophyllum (Sw.) E. G. Britton

The figures were drawn from magnifications three times as great as expressed in the numbers, which represent the magnifications of the figures as they stand in the reproduction.

1. Plant, natural size.
2. Portion of branch showing the flagellate branches and gemmae, × 2⅔.
3. Outline of stem leaf, × 16⅔.
4, 5. Outlines of branch leaves, × 16⅔.
6. Apex of leaf, × 108.
7. Basal portion of leaf, showing the auricle, × 108.
8. Median cells, × 263.
9. Apex of leaf showing the pores in the walls of the apical cells, × 263.
10. Cross section of leaf, × 140.
11. Branch with gemmae, × 85.
12. Gemma, × 138.
13. Cross section of stem, × 140.
14. Perichaetial bud, leaves of one side removed to show the paraphyses and archegonia, × 12.
15. Capsule, × 10.
16. Calyptra, × 10.
17. Stoma from base of capsule, × 195.
18. Portion of peristome and upper part of capsule, × 195.
19. Spores, × 195.

Phytogeographical notes on the Rocky Mountain region
I. Alpine region

P. A. Rydberg

The alpine region, roughly speaking, is the region between the perpetual snow and the timber line.

The upper limit, the perpetual snow line

A perpetual snow line cannot be spoken of in the southern Rockies. Even the highest peaks do not have a perpetual snow cap like Mt. Shasta or Mt. Hood. This is probably due to the less amount of moisture and precipitation. It is true that many of the peaks have perpetual snow on them, but this snow is mostly in the form of snow-drifts and small glaciers, especially on the northern or northeastern side. The amount of snow depends to a great extent on local conditions, as for instance on an exposure to the northwestern winds or partial protection from the direct action of the summer sun. The Snowy Range of Colorado has more snow than the much higher Gray's Peak, Sierra Blanca, or Mount Massive. In the Canadian Rockies and especially in the Selkirk Mountains the conditions are different and more like those of the European Alps. There the highest peaks have a perpetual snowcap and the glaciers extend far down in the valleys. In northern Montana, as for instance in the Sperry Glacier region, are found the only places in the United States where in the Rockies there are glaciers of any great extent, notwithstanding the fact that the Montana mountains are considerably lower than those of Colorado.

The lower limit, the timber line

The timber line is by no means a well-defined boundary line. It is in reality a broad zone in which the woody vegetation gradually thins out from the dense forest to the last krumholz. In nature there is not found any sharp line between two regions, but only a gradual transition zone between them.

Different authors have fixed the timber line differently, as for instance:

1. At the forest line; i. e., where the continuous forest stops.

2. At the grove line; i. e., where the trees cease to form communities of larger or smaller size.

3. At the tree line; i. e., where the arboreal species cease to form trees.

4. The absolute timber line; i. e., where these species disappear altogether, even as krumholz.

To me it seems superfluous to consider more than two of these "lines," viz. the "forest line" and the "absolute timber line," which may be called the Lower and the Upper Timber Lines. But to fix the limit between the alpine region and the subalpine region at either of the two would be erroneous in certain respects. The region between these two timber lines is a transition zone between the two, or it may be still better called a zone of strife. A continuous warfare goes on between the forest and the alpine grassland. A seed from the forest succeeds in germinating between the low alpine plants. A tree grows up. The alpine plants are smothered in the shade. More tree seeds have a chance to germinate and a grove is formed and the forest region is carried upwards.

On the other hand, snow and wind kill the trees on the edge of the forest or the grove, the shade is gone and the alpine plants soon take possession. But more on this subject below.

The width of this transition zone or zone of strife depends on many factors. In one place the forest meets a steep cliff and stops abruptly. In such places there is no transition zone. In other places the lower timber line has been pushed down by a ledge of snow thick enough to last the larger part of the summer and having the power of smothering the trees, but not the herbaceous alpine vegetation. Still above the lower timber line at these places, there might be found isolated trees or groves of trees a thousand feet higher up, especially on higher ground, where the snow has not been so deep. In other places the lower timber line might have been pushed down by wind, not so much by its mechanical force as by its desiccating effects.

In treating the alpine region, I would be inclined to place the boundary at the lower timber line, i. e., the forest line, so as to

include all open spaces of the transition zone as these have a flora alpine in character. In treating the subalpine region, however, I would place the boundary at the absolute timber line, so as to include the groves, isolated trees, and krumholz as well. The groves, if of any size, contain not only the trees themselves, but also wood plants and underbrush belonging to the subalpine region. They are either encroaching on the region above or are themselves remnants of a former forest. So are also the isolated trees and krumholz, although not associated with other plants of the forest.

In a mountain region extending through twenty degrees of latitude, from lat. 35° to lat. 55° (the Rockies north of 55° have not been considered in my work), the altitude of the timber line necessarily varies greatly. In Colorado the lower timber line is found at an altitude of between 3,200 and 3,400 m. and the upper at 3,400 to 3,500 or rarely 3,600 m. In Montana the lower one is at 2,200–2,500 m. and the upper 2,500–2,700 m. In the Canadian Rockies they are even lower.

FACTORS GOVERNING THE TIMBER LINE

The conditions that have been given as causing or modifying the timber line are:

1. A decreased temperature during the growing season.
2. Too short a growing season.
3. Late frost on account of lack of protection from snow.
4. Strong desiccating winds.
5. Deep snow.
6. Form of precipitation.
7. Large mountain masses.
8. Exposure to and protection from direct sunlight.
9. Physiographical barriers.
10. Ecological barriers.
11. Economic timber line.

LOW TEMPERATURE

It is natural that too low a temperature should be one of the important factors causing the disappearance of the forest. The temperature during the winter has, however, very little influence

upon the growing of trees. It is shown that the temperature in temperate regions in the winter often is much lower than in many places in the arctic. It is doubtful if the temperature in the alpine region of Colorado ever becomes as low as on the plains of Montana, where some years ago it was recorded as 65° F. below zero. The only place within the alpine region of the Rockies where a record has been kept during the winter is on the top of Pikes Peak, and here only for a few years. No such low temperature has been recorded there. It is during the growing season that a low temperature limit for forest growths can be spoken of, for during the winter, when the life functions of the plants lie dormant, a few degrees more or less makes in reality no difference. Köppen claims that no trees can grow at a place where the mean temperature during the warmest months of the year does not reach 10° C. Schroeter gives a table taken from the records of the meteorological central station at Zürich in which are given the mean temperatures in July at fifteen stations at the timber line in Switzerland. The mean temperature ranges from 7.75° C. at Zermatt to 15.4° at Monte Generoso. This shows that the timber line may reach a little higher than the isotherm 10° C. and in other cases not reach it. Schroeter is particular enough to mention that at Monte Generoso the low timber line is not an artificial one made by man. See below. The arctic timber line seems to be more coincident with the isotherm 10° C. for July than the timber line in the mountains.

SHORT GROWING SEASON

Another cause of the timber line is the shortness of the growing season. This, it may be, is just as important a factor as the preceding. When speaking of the arctic timber line, it is easy to see that this factor acts parallel to the preceding, for near the sea-level places of the same isotherm in the summer have about the same length of summer, but not so in the mountain regions. In the heads of valleys, where big snowdrifts are formed during the winter and melt late in the summer, and along glaciers and permanent snow the frost is kept longer in the ground and the growing season is naturally shortened. Therefore, in many places in the Rockies, the timber line is a thousand feet or more lower in the valley heads than on the slopes on the sides. The shortness of

the season may have also another effect on the timber line, i. e., the seeds would not have time to ripen. This may be of great importance in accounting for the arctic timber line, but it can have very little influence on the alpine timber line, for most of the conifers that reach the timber line have winged seeds, which are easily carried above the line of maturing seed and then can germinate there.

LATE FROST

Another factor which has been given as having effect on the timber line is late frost in the spring, killing the new sprouts. As the conifers, which are most affected, do not readily produce a second crop of shoots the same season, the forests after a few repeated frosts will soon be killed. In such a way large districts of pine forest were destroyed in Montana a few years ago.

STRONG DESICCATING WINDS

One of the most important factors is strong wind. This factor has been much underestimated in earlier times, but later writers on the phytogeography of the arctic regions have recognized it more and more. In my belief it is one of the most important factors in the Rockies. The trees at the timber line and especially those few isolated stragglers above the real forest line show marked effects from the wind. The trees are not only low, stunted, gnarled, ragged, with enormously elongated lower branches often spreading on the ground, but conspicuously one-sided, telling at the glance the direction of the prevailing winds. But the mechanical influence of the wind is not the most important, however. Of greatest importance are its desiccating effects, especially in the winter. This effect of the wind has been recognized even in arctic regions, but it must be taken into consideration still more in the mountains. The timber line is much lower on the north side of the Alps than on the south side. This is due not only to the difference in temperature (for the difference in altitude should not be so great), but still more to the desiccating northern winds. In some places in Montana these winds are northerly, but in southeastern Colorado and southern Utah they are from the southwest, and it is on this side of the mountains that the timber line is the lowest. In the Abajo Mountains of southeastern Utah, for

instance, there is no timber line at all on the southern and western sides, for no timber is growing between the semi-arid cedar-pinyon belt and the top of the mountains. The whole southern and western slopes of the mountains proper are covered by a semi-arid grass formation. The highest peaks (altitude about 11,000 feet) just reach the timber line on the eastern and northern sides, only one or two hundred feet belonging to the alpine region. The desiccating effects of the winds are increased by the thinness of the atmosphere.

DEEP SNOW

Deep snow is also a factor. As the desiccating wind lowers the altitude on the wind-swept ridges so does the snow in the heads of the valleys. I have already mentioned that the great snow-drifts or glaciers here shorten the growing season. But the snow-drifts have also a direct mechanical influence on the timber line in the way of smothering the tree vegetation. Herbs and low shrubs can withstand being covered by snow much better than a tree, for their growing season does not begin before the snow is practically off the ground, while the tops of the trees may be above the snow and exposed to the summer heat months before the snow cover of their roots and lower branches has melted. The lower portion of the tree is cut off from the air while the upper portion is already in vital activity. It is easy to distinguish trees stunted by the action of the wind from those stunted by the smothering snow. In the former the lower branches are enormously developed compared with the upper, and often creeping along the ground, while in the latter the lower branches are dead and covered by fungi or their mycelia.

The usual condition in the Rockies is, that wherever there is a large valley head, where the snow has a chance to lodge, this is always devoid of trees, except in places of higher ground, where the snow-drift has not been so deep and has had time to melt earlier in the summer. On such higher places there are often groves or isolated trees. The absence of trees in such a valley head is due less to the shortness of the season, produced by the snow, than to the smothering of the tree vegetation.

FORM OF PRECIPITATION

Another important factor influencing the timber line is the form of precipitation. In high altitudes the air is too rare to hold much moisture and the rain falls at the least lowering of the temperature. The rain falls therefore either in the form of mists or in light showers, which only wet the surface of the ground. It may be sufficient to keep alive the low rosettes or cushions of the alpine vegetation, but it is not sufficient for the deep-rooted trees. Furthermore, if a little heavier rain should come, the water would rush down the steep slopes of the mountains, not having time to sink down into the ground. The tops of the mountains are therefore arid, because the air is too rare to hold much moisture and quickly gives it up in light showers. Nowhere in the Rockies proper is the moisture very great. In the foot-hill regions and on the surrounding plains the temperature is too high in the summer to allow any precipitation. These zones are therefore also arid. It is at middle elevations that the precipitation is the greatest. The air here is dense enough to hold more moisture and the temperature low enough to allow precipitation. It is also at middle altitudes that we find the forest areas in the Rocky Mountain region.

LARGE MOUNTAIN MASSES

In the Swiss Alps, observations have been made that in regions of large mountain masses, as for instance in the Monte Rosa region and the Engadine and others, the timber line is higher than on isolated mountains. I have not seen any satisfactory explanation of this fact. It may be due partly to the fact that the central mountains of such massed groups are more or less protected from the desiccating winds. It may be due also to the circumstances that in the winter more snow lodges between the mountains, the melting of it is more retarded, and the water is more arrested in its downward course by the trees and their roots. The air in the summer time would be therefore, from the evaporation, more loaded with moisture, which would naturally also benefit the mountain tops. Whatever the real cause may be, it seems as if the observations made in Switzerland hold good in the Rockies. From my own experience, I know that the timber line in the isolated Belt Mountains and Crazy Mountains in Montana

is much lower than in the main Rockies, as for instance in the Yellowstone Park. The Belt Mountains would not be high enough to have a timber line if they were in the Rockies. So also in the Wahsatch and La Sal Mountains, the timber line is much lower than in the Rockies of Colorado. Even in the Colorado Rockies themselves, the timber line seems to be higher in places where the mountains are more massed. So for instance is it higher on Mount Massive and other mountains around Leadville than on the more isolated Pikes Peak, Sierra Blanca, or Longs Peak. I understand that on the isolated Mount Shasta, the timber line is much lower down than on the peaks of the Sierra Nevada, but here it may depend upon the proximity of the ocean, the greater moisture, and the consequently larger snowcap on Mount Shasta.

EXPOSURE TO SUNLIGHT

Exposure to the direct sunlight and protection from it evidently also have influence on the altitude of the timber line, though perhaps not so much as one might expect. The insolation on the mountain tops in direct sunlight is very great. Schroeter estimates that on the top of Mont Blanc it is 26 per cent stronger than in Paris. The Rockies of Colorado have about the same height as Mont Blanc and are situated from 5° to 8° farther south, and the insolation is fully as great. The amount of light and heat which can be absorbed by the plant is therefore much greater on the mountain tops than on the plains. The radiation is also very great in the higher altitudes so that the temperature in the shadow is much lower. According to Schroeter the timber line lies 100–200 meters higher on the southern side than on the northern, and DeCandolle claims that the limiting line of vegetation, of plants in general, is at an average of 200–300 meters higher on the equatorial side. These statements cannot be verified in the Rockies. The timber line in Colorado is, perhaps, higher on the northern side, but this is probably due to other conditions. The timber line trees of Colorado are mainly *Picea Engelmannii*, *Abies subalpina*, and *Pinus aristata*. The first two are trees that need a great deal of moisture, and their seedlings require shade. These two trees are therefore more confined to the more shady and wetter northern slopes, where they also

extend higher up. *Pinus aristata* is a tree that stands much more drought and is found more on the southern slopes, but it is a tree of little value as a forest tree, growing scatteringly only. To me it appears to be a species which has passed its best development and is in process of dying out.

PHYSIOGRAPHICAL BARRIERS

One of the conditions modifying the altitude of the timber line is to be found in physiographical barriers. Among these may be counted snowdrifts and glaciers, but these have been already mentioned. Besides these, the most important are precipitous cliffs and rock-slides. Very little needs to be said about these barriers. Neither gives the forest trees a chance to grow. Meeting one of these barriers, the timber may cease to grow thousands of feet below the physiological timber line. Wherever a steep cliff arrests the forest, many of the alpine plants will be found growing in the crevices, hundreds or even a thousand feet lower than usual, and there are a few plants characteristic of the rock-slides. These may be best included in the alpine vegetation.

ECOLOGICAL TIMBER LINE

Sometimes an ecological timber line is mentioned, i. e., where bacteria in the soil and other organisms necessary for the growth of trees cease to exist. Theoretically, I can easily see that such a timber line may exist, but practically I have no information that such a one is found in the Rocky Mountains, distinct from the merely physiological one. No investigation in this line has been made.

ECONOMIC TIMBER LINE

In Switzerland there exists also an economic timber line. The alpine meadows are there used as summer pastures for sheep and goats. These animals make depredations on the young trees and hinder the spreading of the forest, but in many places the subalpine forest is actually cut down by men to make room for more pastures. In either case the alpine conditions will be brought further down the mountains and the timber line lowered. Such an economic timber line cannot be said to exist in the Rockies.

ALPINE VEGETATION

After having discussed the causes of the timber line, it is easier to define what an alpine plant is. In short, it is a plant that can endure the climate of the mountains above the timber line. It is a plant that requires less heat during the growing season than the forest trees, or that can survive a shorter growing season, or is less affected by frost, and besides can better withstand desiccating winds, deep snow, reduced precipitation, etc., or a combination of such conditions. Some authors claim that alpine and arctic plants are xerophytes, but they are not necessarily so. While most of the plants of alpine and arctic regions can withstand a great deal of drought, in fact are xerophytic plants, it is not the case with all. Not a few of the arctic-alpine plants require a great deal of moisture, growing only below and around snowbanks, or in springy or boggy ground, as for instance several species of *Ranunculus*, *Saxifraga* (in extended sense), *Salix*, and many grasses and sedges. There are in the arctic-alpine regions even true aquatics, as for instance among the phanerogams, *Catabrosa aquatica*, *Phippsia algida*, *Sparganium minimum*, and *S. hyperboreum*, and a few species of *Potamogeton*.

NEW YORK BOTANICAL GARDEN

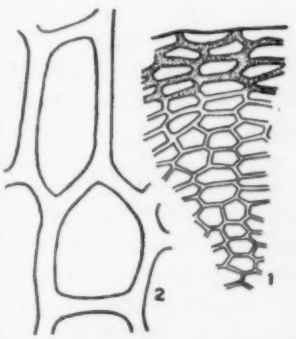
New ferns from tropical America—III

MARGARET SLOSSON

(WITH PLATE 26)

Trichomanes rhipidophyllum Slosson, sp. nov.

Rhizome creeping, about 5 mm. in diameter, thickly tomentose; stipes brown and tomentose to within about 1 mm. of the lamina, then green, slightly hairy, and winged by the narrowly and abruptly decurrent base of the lamina, in fertile fronds 5–7 mm. long, in sterile 1.5–3 mm. long; laminae shining bright green, delicately papyraceous, the fertile 0.8–1.1 cm. long, 0.7–1.3 cm. broad, suborbicular, almost semicircular, or subtrapezoid, at apex slightly once cleft, at base subtruncate or cuneate, the sterile 0.4–1.3 cm. long, 0.5–1.5 cm. broad, round-reniform to ovate or broadly obovate; margins irregularly undulate or sublobate, marginal hairs few, slender, simple or binate; surfaces or at least the lower one with a few short club-shaped mostly 2-celled hairs on the veins; veins few, distant, in the sterile fronds subflabellately forked, midveins of fertile fronds flexuose, with about 3 pairs of branches forked 1–4 times, spurious veins short, almost none; cells of the lamina between the veins variable, mostly narrow, 0.056–0.116 mm. long, 0.020–0.040 mm. broad, their walls 0.004–0.008 mm. broad; involucres 1–2, borne at the base of the central cleft of the lamina, almost wholly exserted, the lips 1.5 mm. broad, their brown border 1–4 cells deep; spores globose, 0.044–0.056 mm. in diameter.



Trichomanes rhipidophyllum. 1, cellular structure of the margin of the lip of the involucre, enlarged; 2, cells from between the veins of a sterile frond, very much enlarged.

Type in the Underwood Herbarium at the New York Botanical Garden, collected on a tree in a damp forest near Onaca, Colombia, at an altitude of 760 m., Aug. 24, 1898–99, *Herbert H. Smith 2445*. A note on the label says "not observed elsewhere." A very distinct species belonging to the section or subgenus *Didymoglossum*,

not likely to be mistaken for any other. Marked by its bright shining green color, rounded, undulate or not more than sublobate margins, and few flabellately forked veins tapering toward the apex. From *Trichomanes sphenoides* Kunze, which also has flabellately forked veins tapering toward the apex, it may be easily distinguished by the greater distance between the tips of the true veins, varying from .5 to 2 or 2.5 mm., and by the very thick walls of the cells of the laminae.

Polystichum machaerophyllum Slosson sp. nov.

Rhizome erect, its scales light brown, 2.5–6 mm. long, ovate to oblong, fimbriate or subfimbriate; scales of lower part of the stipes similar, passing into minute scales scattered over both surfaces of the frond, which are elongate-caudate, entire or slightly toothed, from a short more or less fimbriate-ciliate base; fronds up to 51 cm. long, up to 7.1 cm. broad; stipes 2.5–20.5 cm. long, brownish-stramineous or greenish, channeled on the face, rounded at the back, the upper part channeled also or flattened on the sides; rachis similar to upper part of the stipe; laminae brownish olive, lanceolate or lance-linear, slightly tapering toward base, pinnate, the apex in young fronds often deltoid-acuminate, in mature fronds of two kinds, the first subcaudate, elongate-linear or lanceolate, subentire or undulate or serrate-lobate, often proliferous at tip, the second flagelliform and proliferous at tip, naked or with a few small scattered pinnae, both kinds sometimes on the same frond, the second terminating the first; pinnae mostly alternate, 8–27 to a side, usually approximate or distant, the lower short-stalked, the upper sessile or subsessile or adnate, often passing into short variously shaped often obovate segments, principal pinnae broadly cuneate-hastate, above the auricles deltoid to linear, the basal margins entire, the outer margin subentire or undulate or with one or more minute occasionally spinescent teeth or in large fronds irregularly crenately lobed, the lobes sometimes mucronate, basal auricles and apex of pinnae spinescent; texture coriaceous-chartaceous; venation pinnate, obscure, veins very oblique, about 1–4 times forked, the basal auricles with distinct midveins; sori usually about midway between the midvein and the margin of the frond, or nearer the midvein, rarely a few submarginal; indusia more or less erose or with a few cilia; sporangia glabrous; spores cristate.

Type in the Underwood Herbarium at the New York Botanical Garden, collected at Arroyo del Medio, above the falls, Sierra

Nipe, Oriente, Cuba, altitude 450–550 meters, December 22, 1909, *J. A. Shafer 3262*. The label reads: "Shaded rocks near water."

This plant is closely related to both *Polystichum ilicifolium* Fée and *P. triangulum* (L.) Fée, and very likely may be a hybrid between the two. Numerous specimens have been seen, all Cuban, and excepting Wright's specimens, all from the Province of Oriente. Wright's specimens bear the indefinite inscription of "Cuba" and "Cuba orientale," but are dated 1859, 1860, and 1865. During the first two years Wright is known to have collected in the Province of Oriente, but in 1865 he is believed to have collected only in the western part of Cuba.*

Polystichum machaerophyllum in a mature state is easily distinguished from *P. triangulum* by the peculiar apices of the fronds, varying from long-drawn-out to flagelliform, non-proliferous to proliferous. It is more likely to be confused with *P. ilicifolium*, but may be known by the proportionately broader and shorter laminae; their darker olive-green color, resembling that of *P. triangulum;* and the larger and longer pinnae, distinctly biauriculate at base, with the part above the basal auricles not short and margined with large sharp oblique spinescent teeth, as in *P. ilicifolium*, but more or less extended and subentire or very slightly toothed or crenately lobed, the lobes entire or minutely mucronate. The indusia are peculiar, varying from only slightly erose to markedly so with a few cilia. The indusia in *P. triangulum* are entire, and in *P. ilicifolium* vary from markedly erose to conspicuously long-ciliate. *P. decoratum* Maxon, the only other Cuban *Polystichum* known with fronds flagelliform at apex, may be readily recognized by its pinnae widely excised, not auricled, at base on the lower side.

The following specimens of *P. machaerophyllum* at the New York Botanical Garden and in the U. S. National Herbarium in Washington have been examined:

CUBA: Camp La Gloria, south of Sierra Moa, Oriente, Dec. 24–30, 1910, *Shafer 8096;* bank of river among stones, Camp La Barga, Oriente, altitude 450 meters, February 22–26, 1910, *Shafer 4127;* on moist rocks, Cooper's Ranch, base of El Yunque Mountain, Baracoa, March, 1903, *Underwood & Earle 1179, 1180;*

* See L. M. Underwood, A Summary of Charles Wright's Explorations in Cuba, Bull. Torrey Club **32**: 298, 300. 1905.

vicinity of Baracoa, February 1–7, 1902, *Pollard, Palmer & Palmer 237;* "in Cuba Orientale," 1859, 1860, *C. Wright 828* in part; without specific locality, 1865, *C. Wright 828* in part.*

Explanation of plate 26

1–3. *Trichomanes rhipidophyllum;* 1, rootstocks and leaves, slightly reduced; 2, 3, sterile and fertile frond, enlarged, showing venation; *H. H. Smith 2445.*

4, 5, and unnumbered figures. *Polystichum machaerophyllum;* 4, indusia, enlarged, *Shafer 3262;* 5, scale from stipe, enlarged, *Wright 828;* unnumbered figures, various forms of the plant, reduced, *Shafer 3262.* (Some of the basal auricles of the pinnae do not show clearly in the photograph, owing to a slight infolding of the dried specimens.)

* In the Underwood Herbarium and in the U. S. National Herbarium the remainder of Wright's no. 828 is *P. decoratum.*

INDEX TO AMERICAN BOTANICAL LITERATURE

1907–1913

The aim of this Index is to include all current botanical literature written by Americans, published in America, or based upon American material; the word America being used in the broadest sense.

Reviews, and papers that relate exclusively to forestry, agriculture, horticulture, manufactured products of vegetable origin, or laboratory methods are not included, and no attempt is made to index the literature of bacteriology. An occasional exception is made in favor of some paper appearing in an American periodical which is devoted wholly to botany. Reprints are not mentioned unless they differ from the original in some important particular. If users of the Index will call the attention of the editor to errors or omissions, their kindness will be appreciated.

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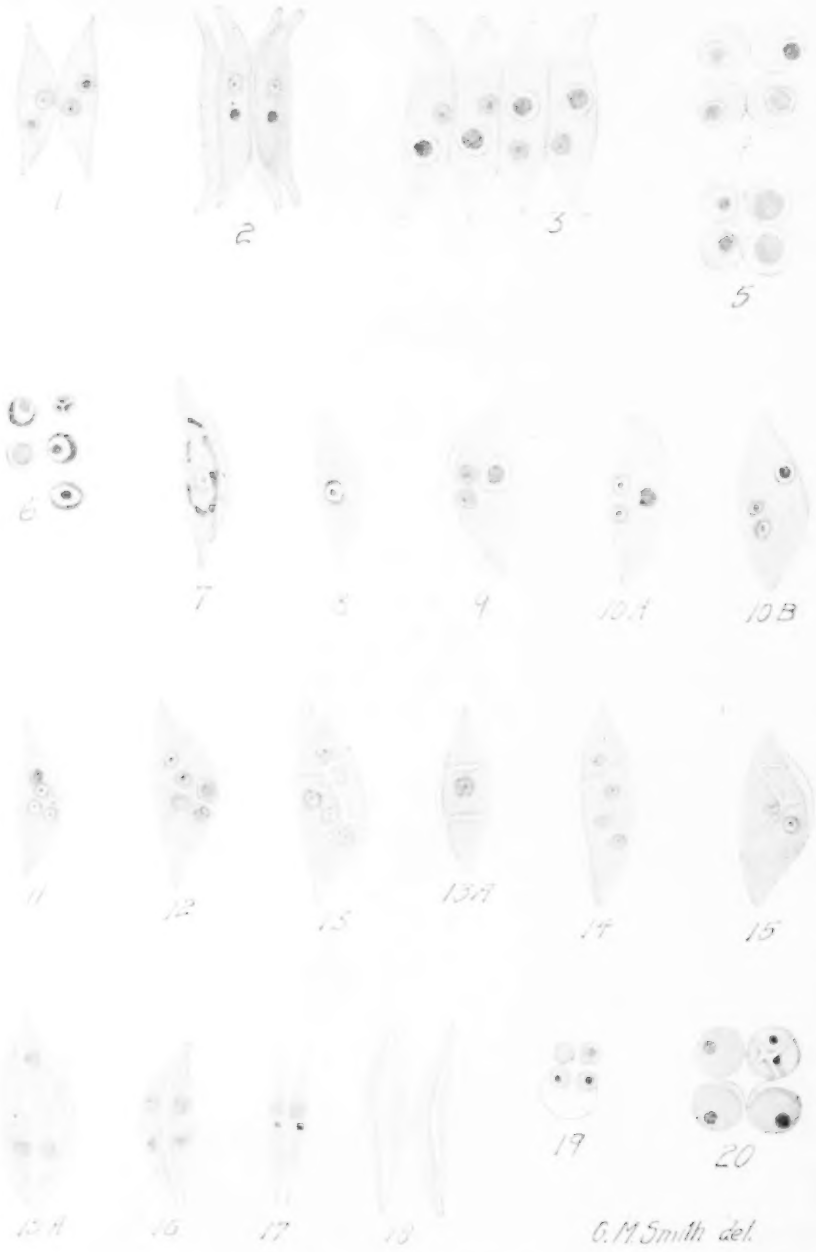

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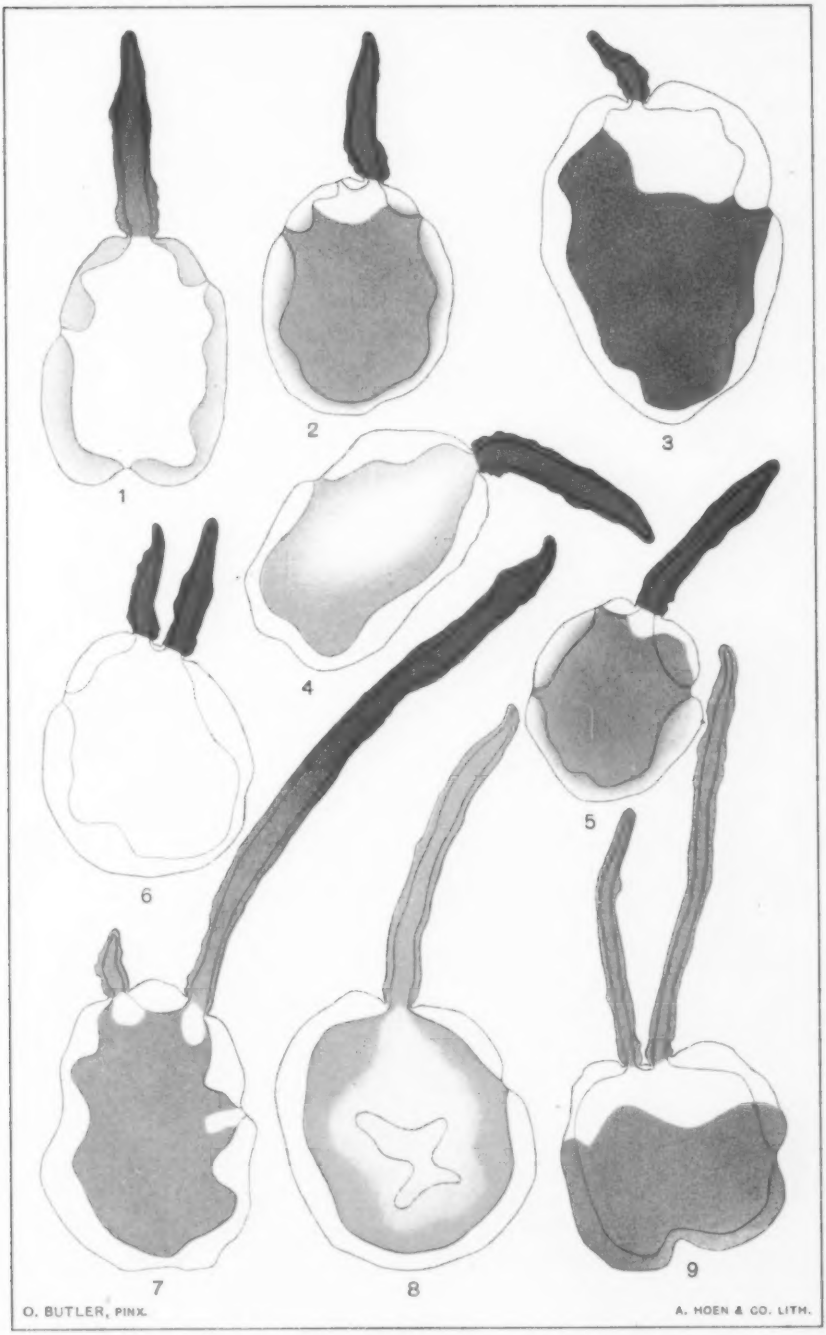

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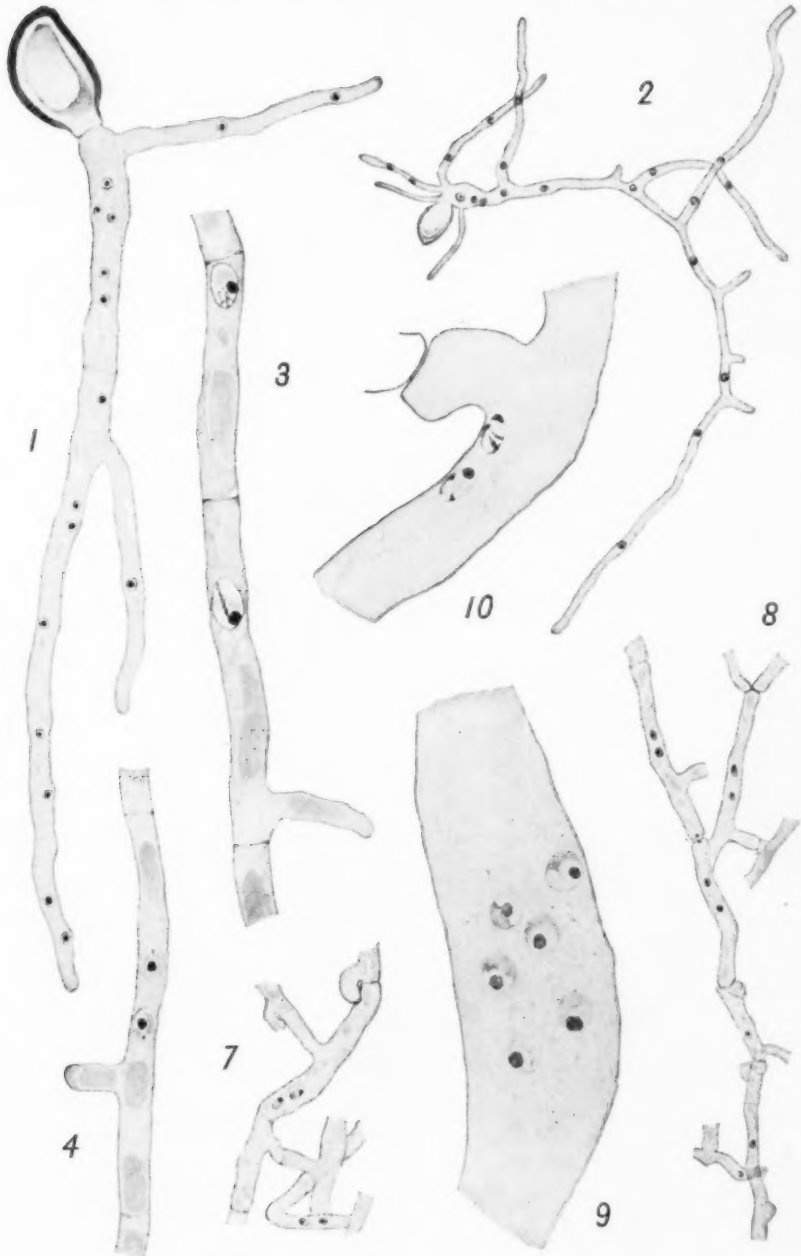

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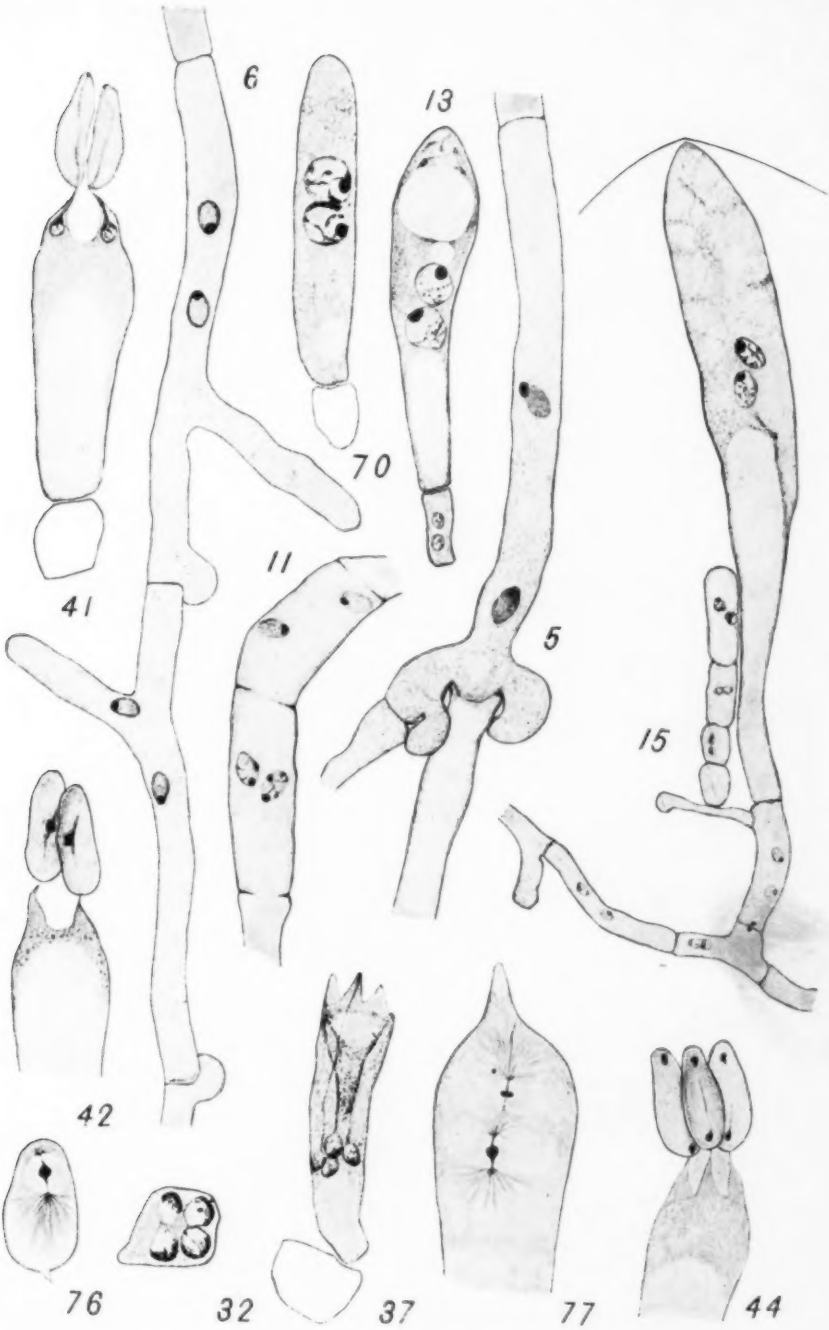

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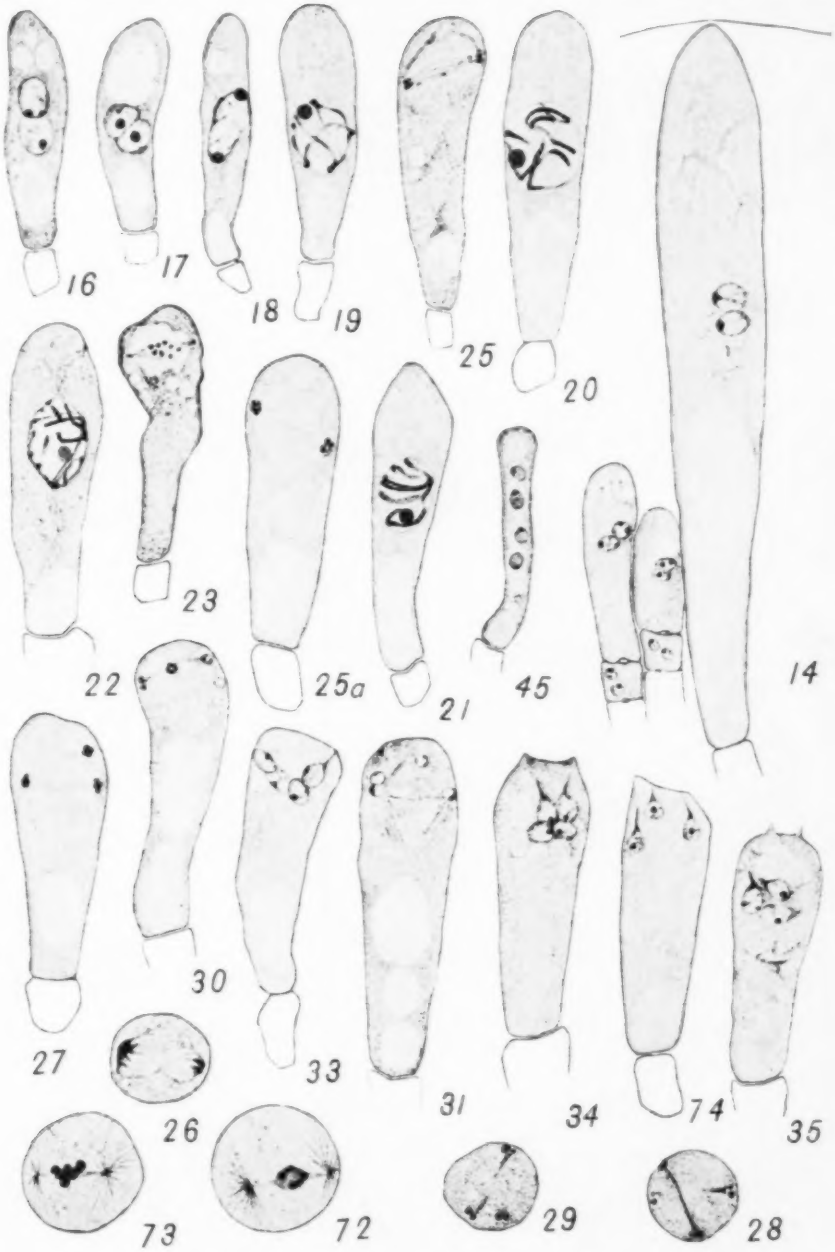

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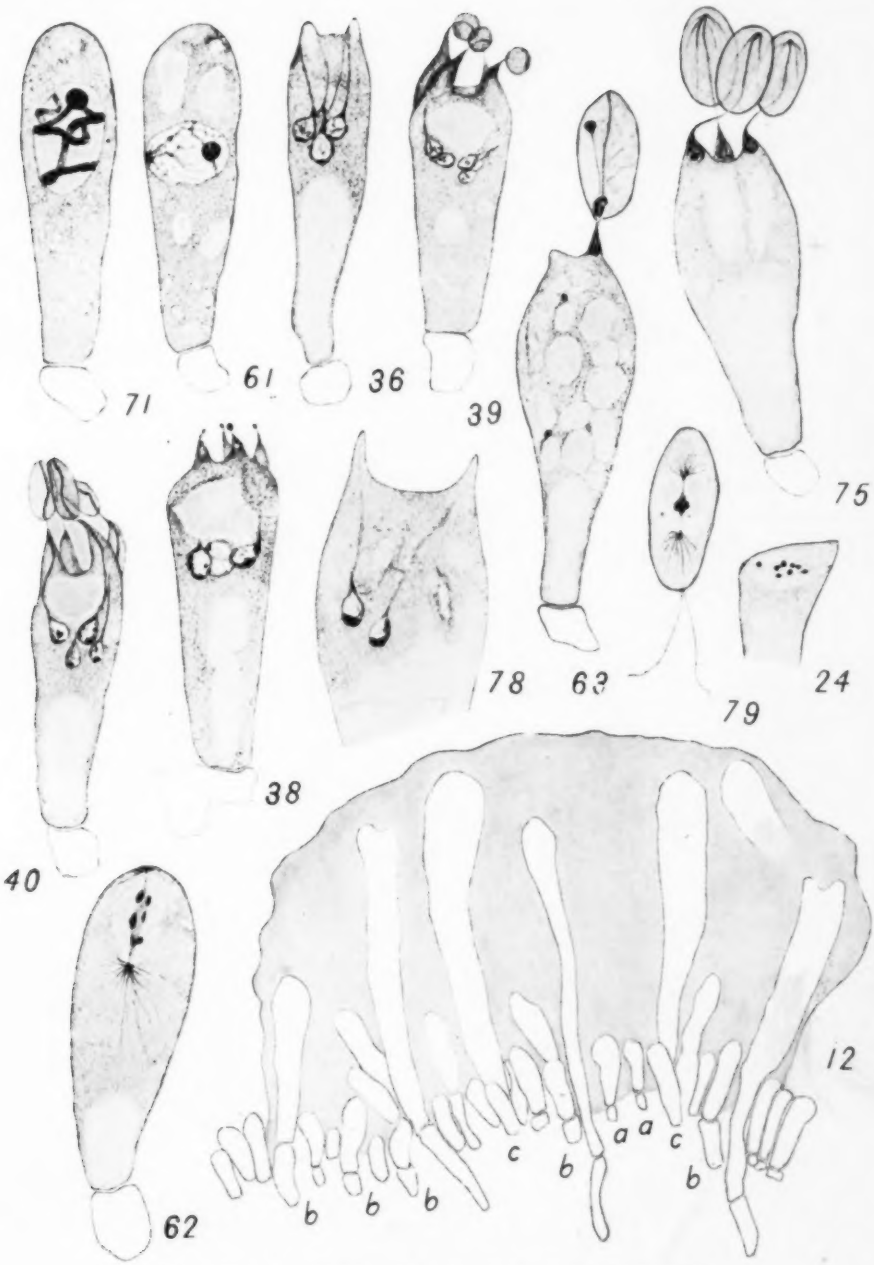

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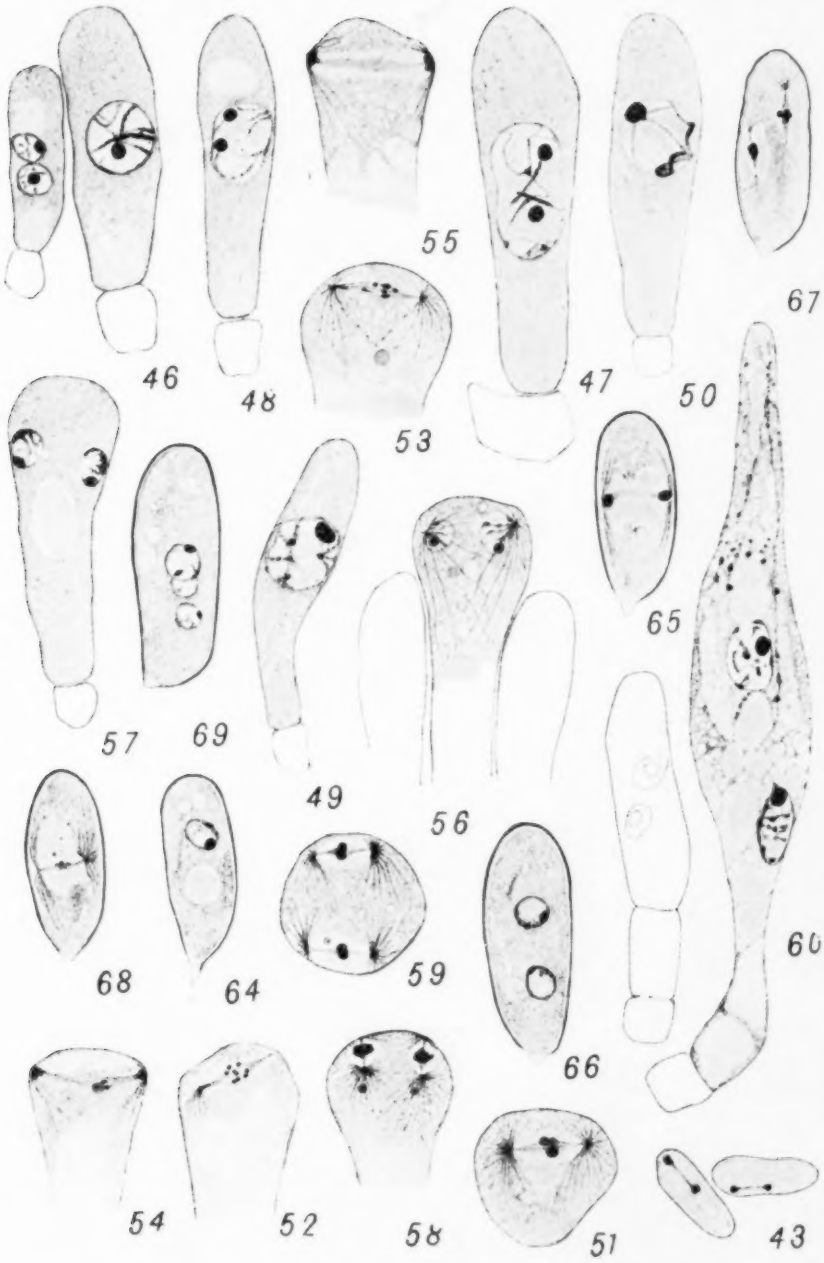

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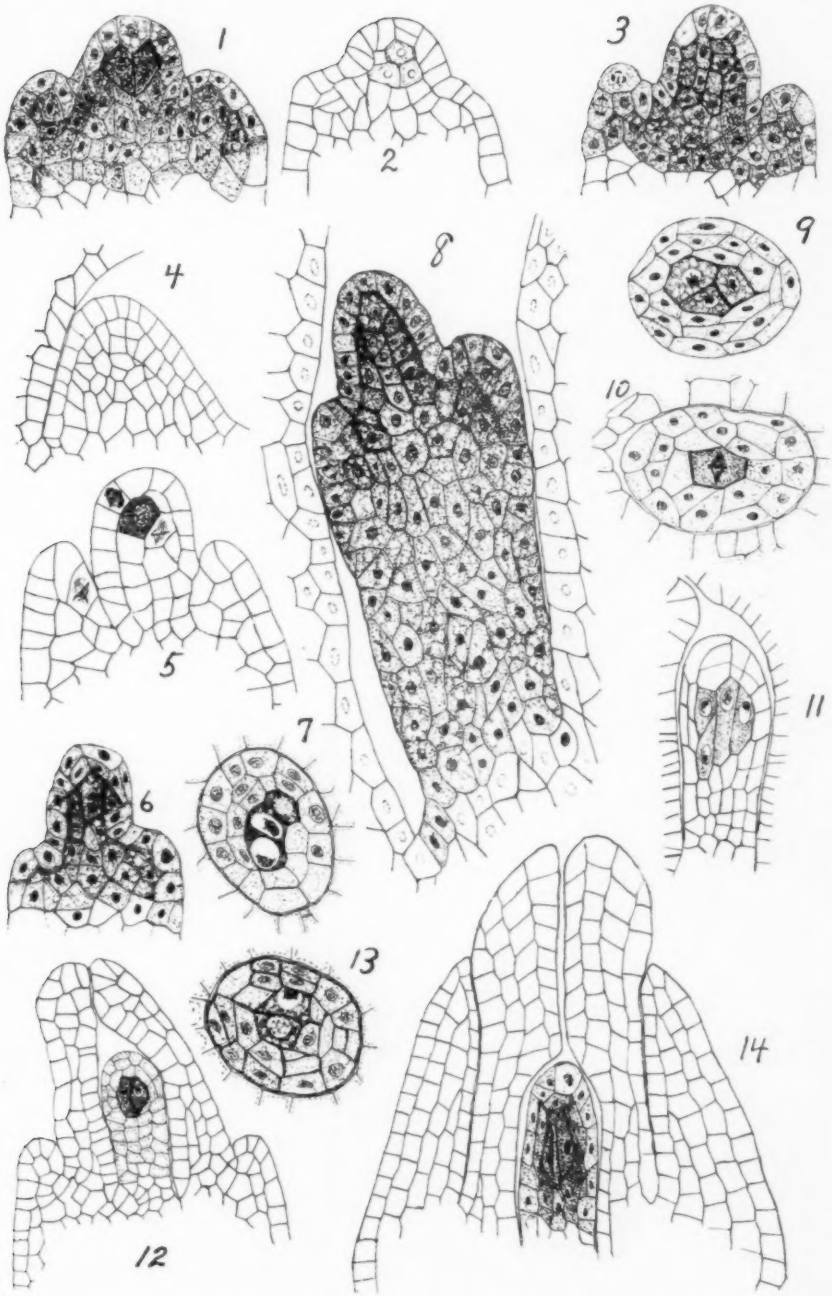

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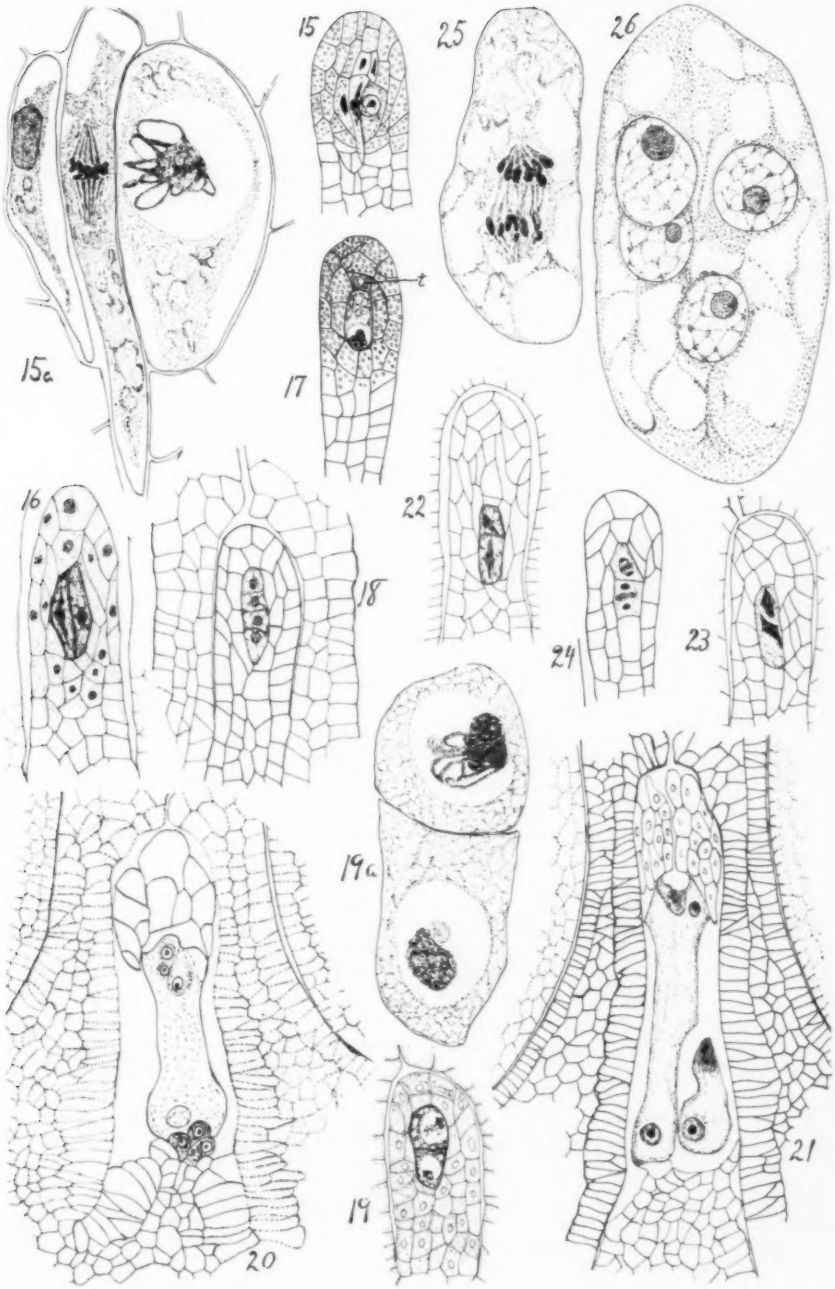

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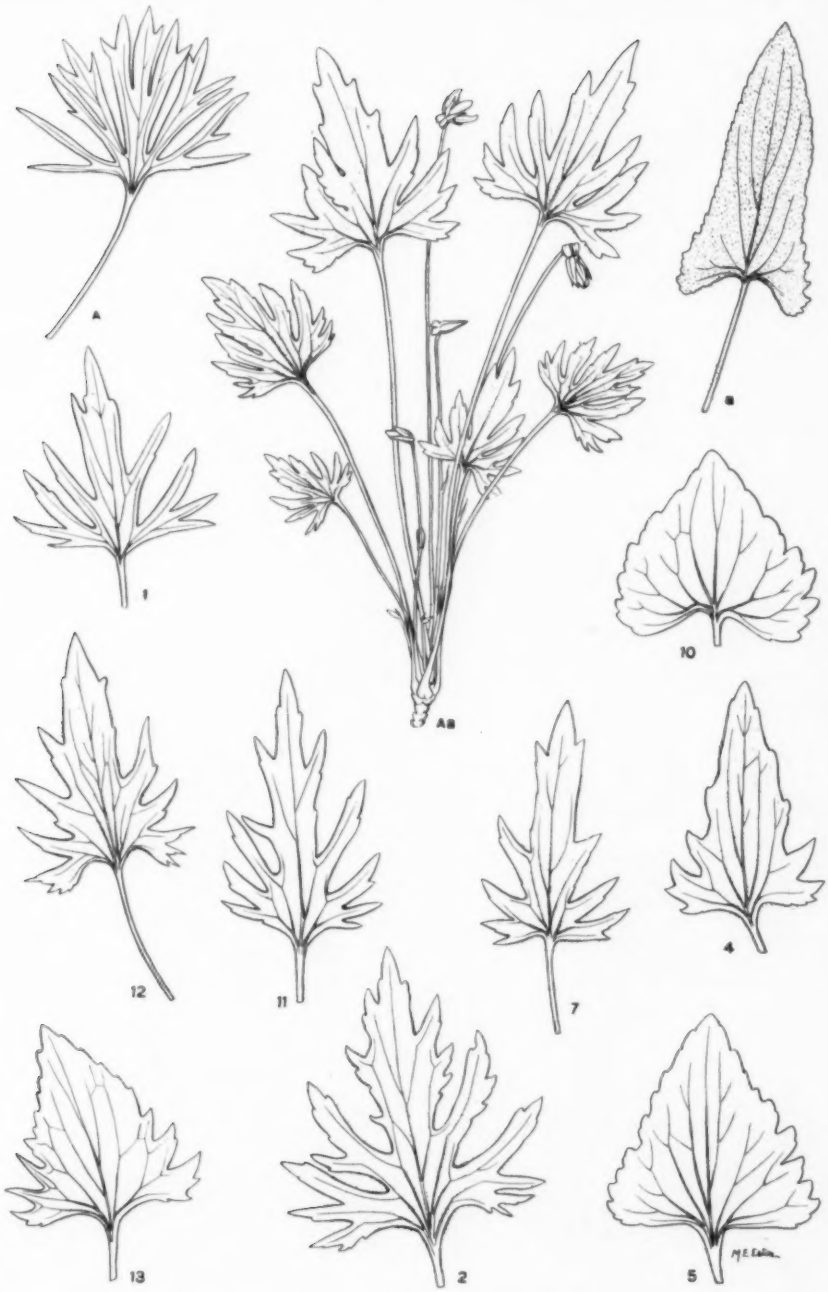
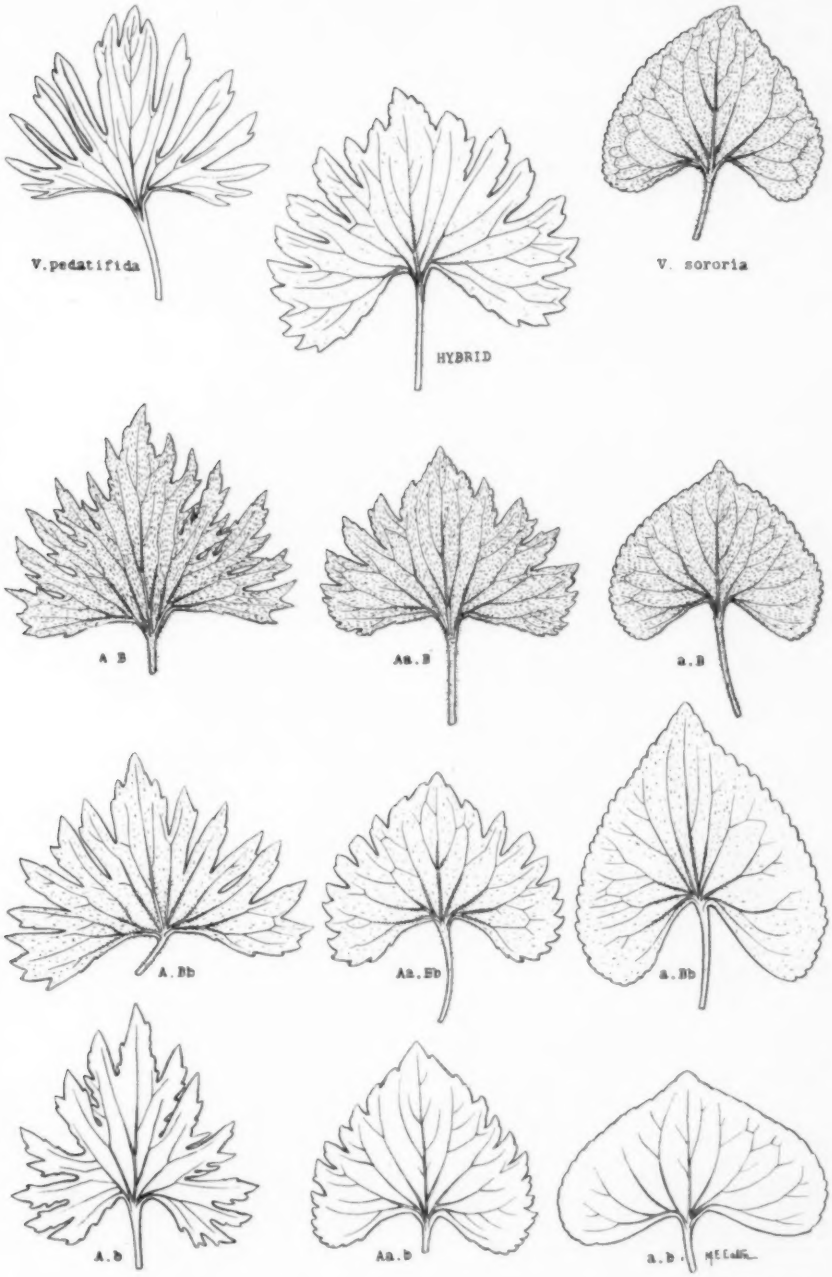
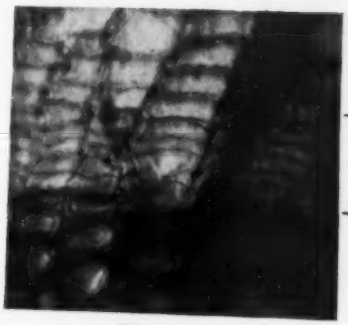


VIOLA PEDATIFIDA ×SAGITTATA AND LEAVES OF ITS PARENTS AND OF NINE OFFSPRING



LEAVES OF VIOLA PEDATIFIDA × SORORIA, OF ITS PARENTS, AND OF NINE OFFSPRING



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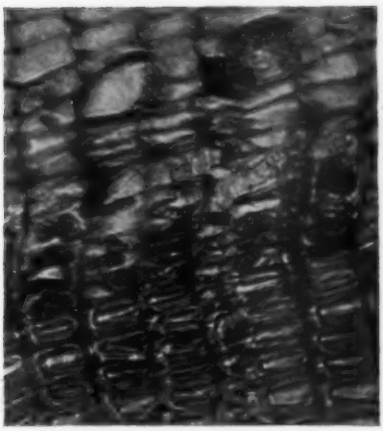

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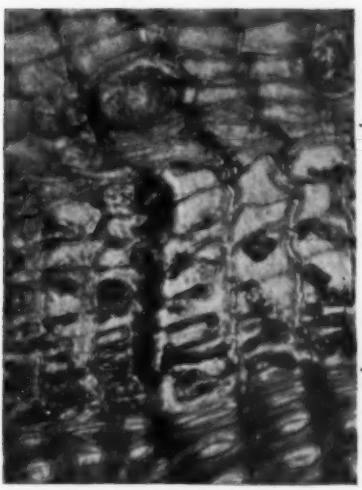

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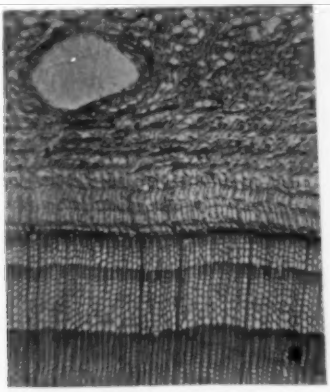

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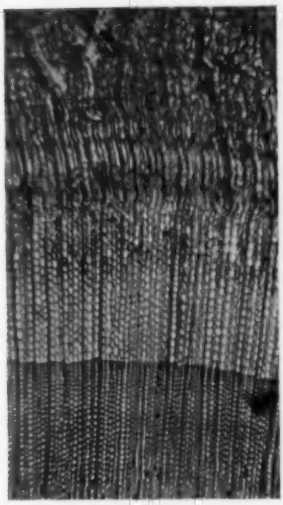

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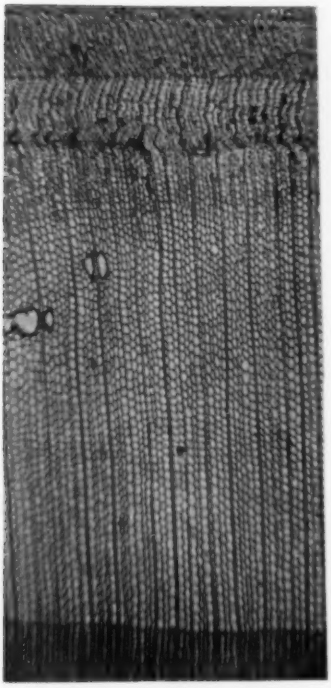

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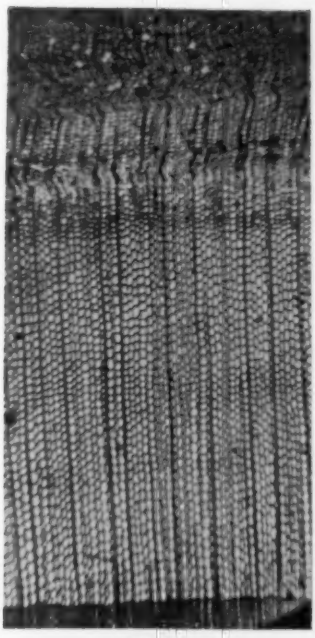

FIG. 6

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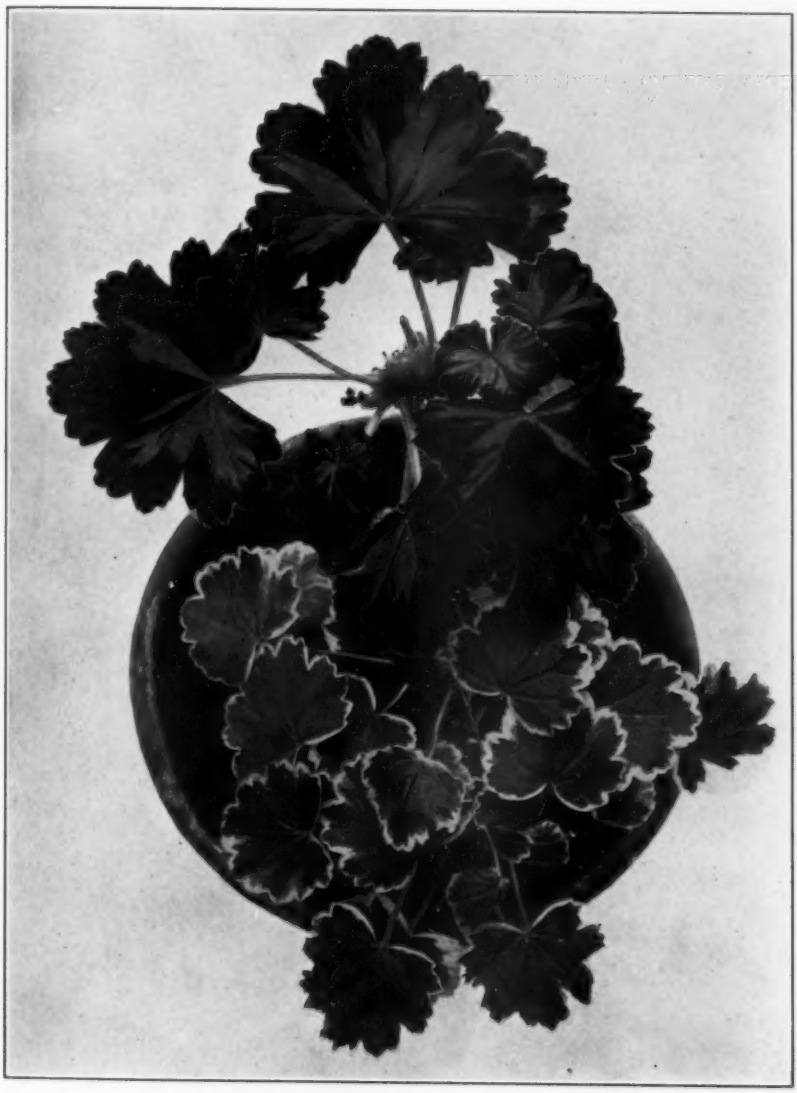

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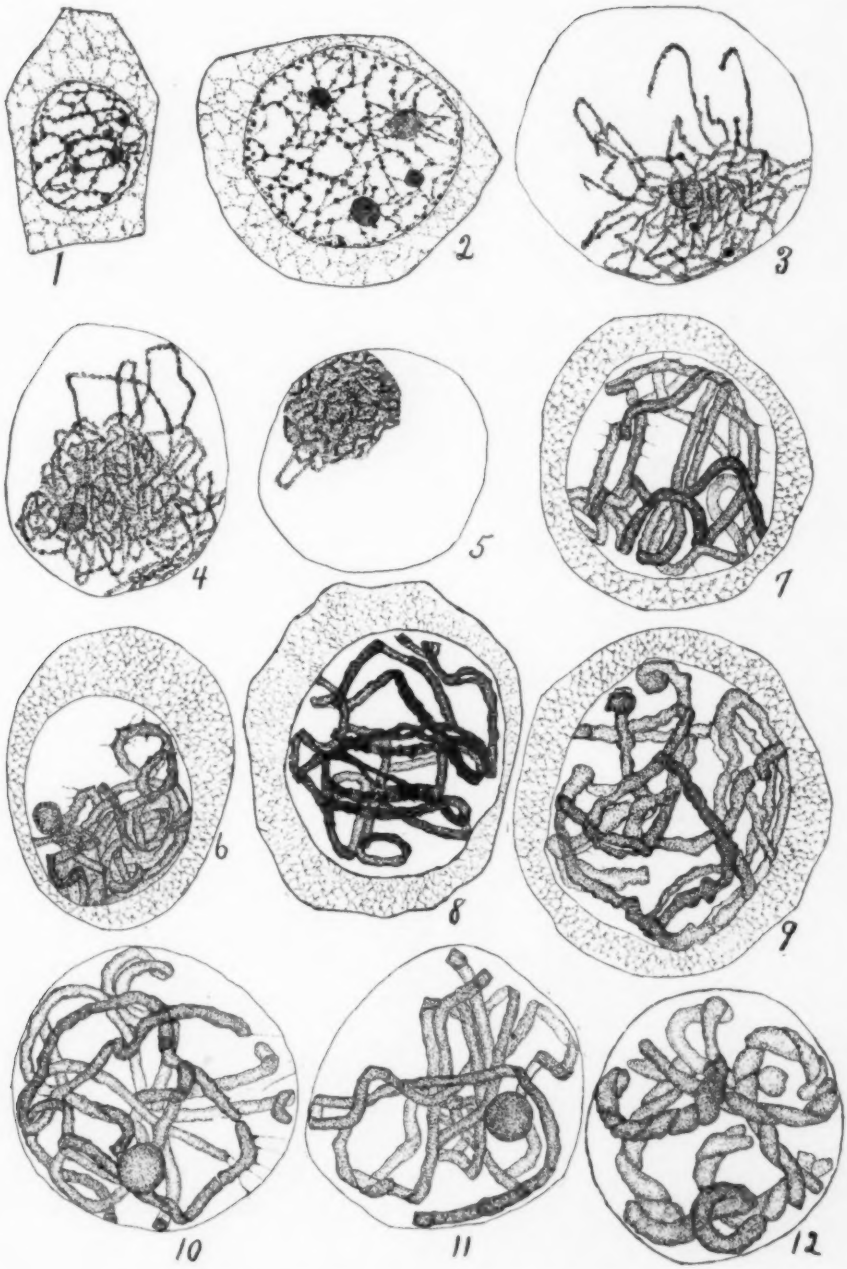
FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4



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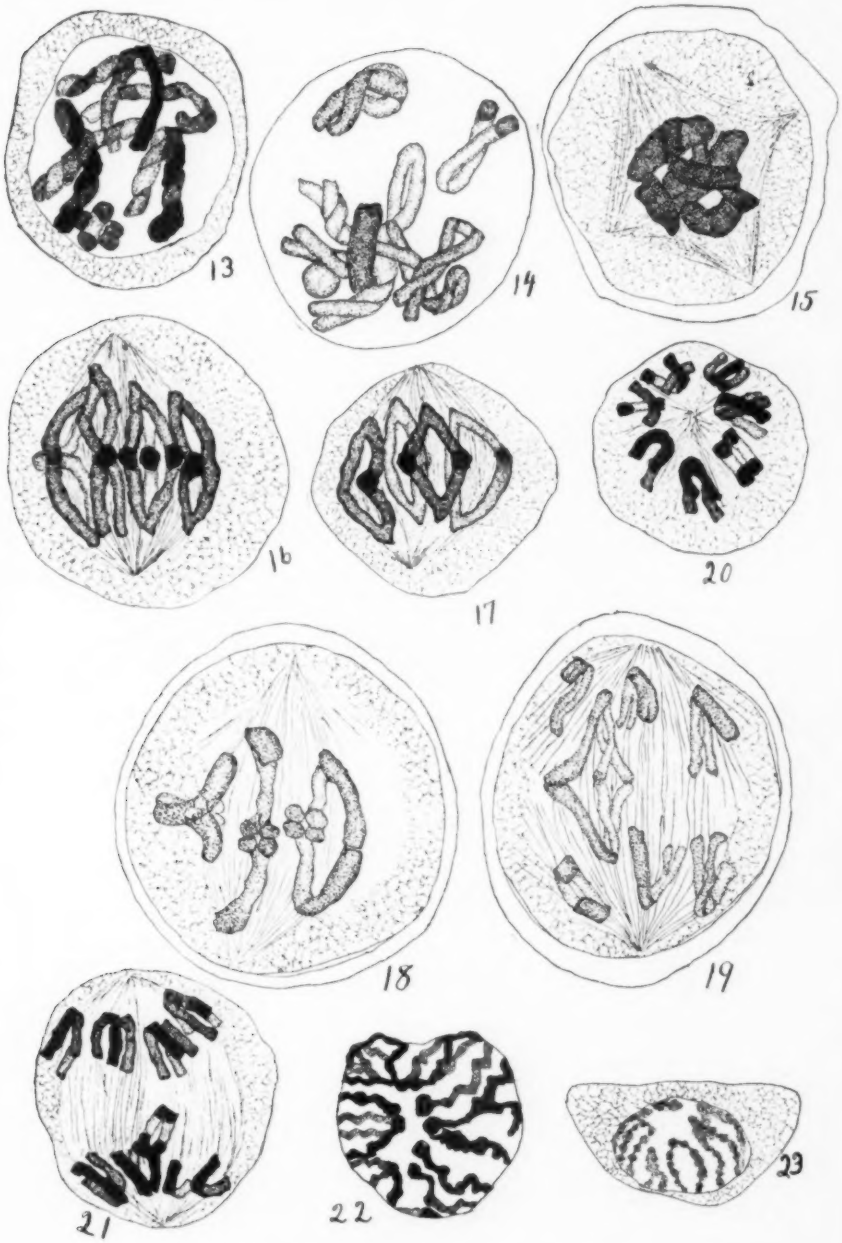

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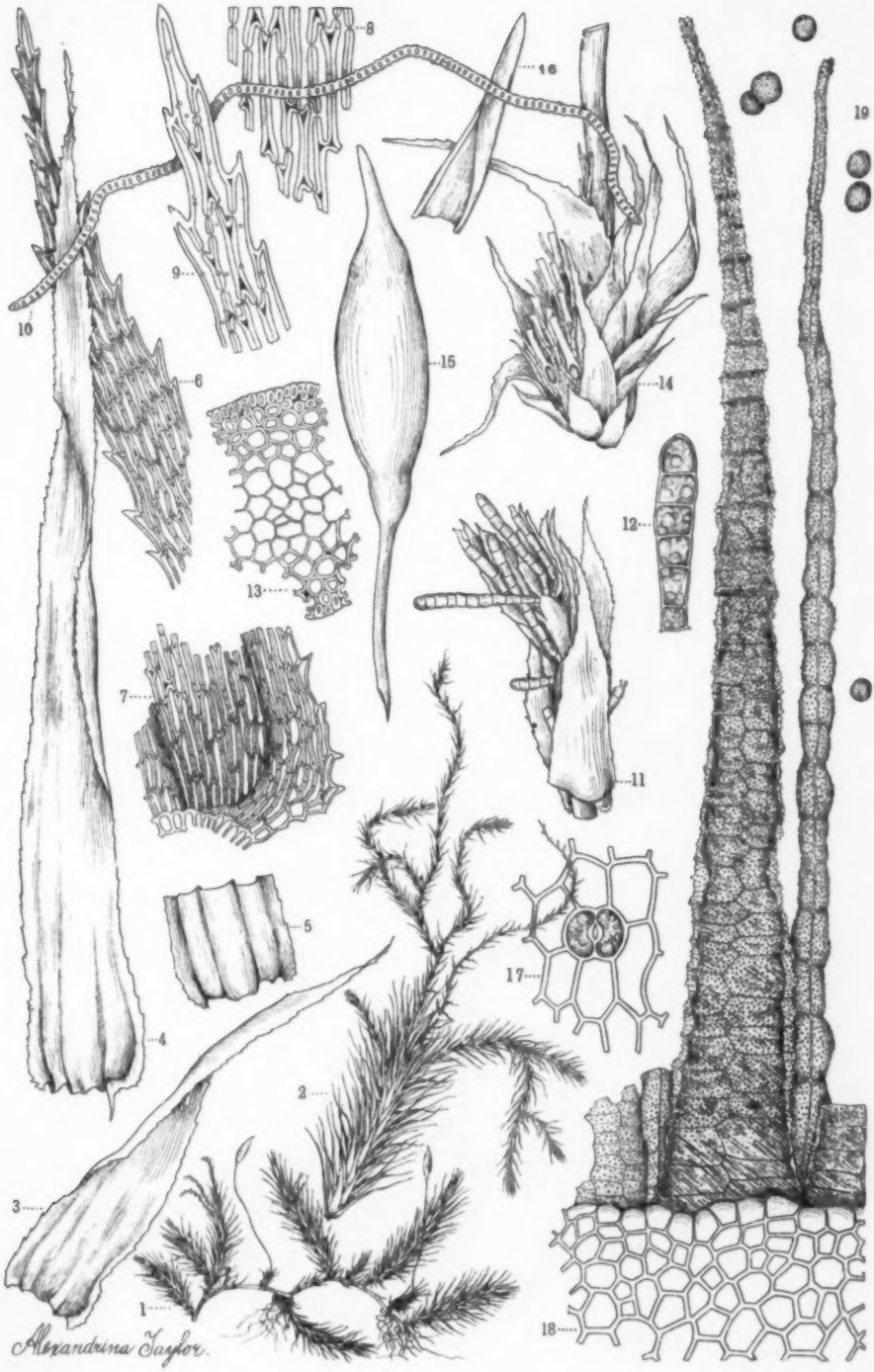

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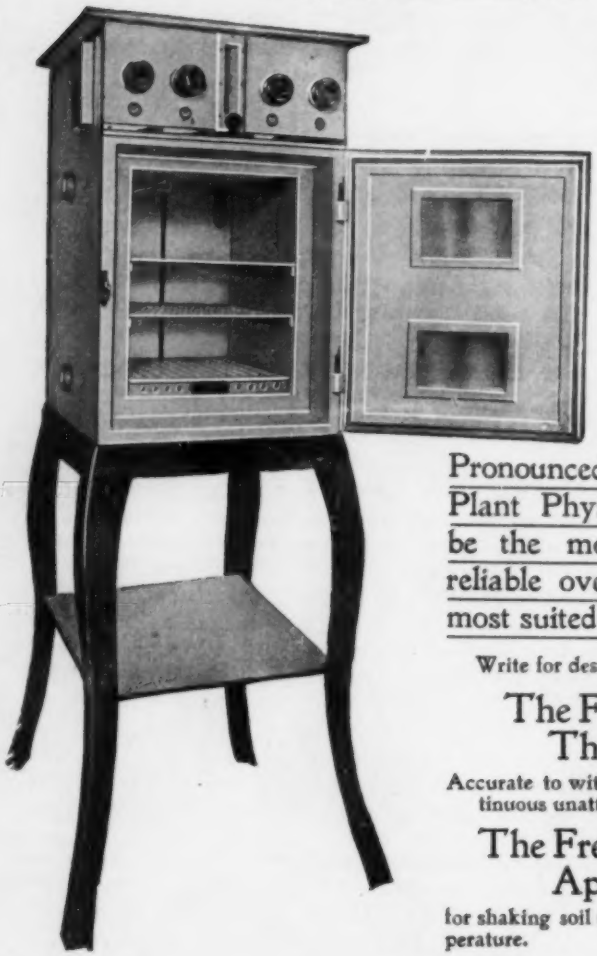

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